Vol. XXVII. No. 2]. [February, 1915.

# The Journal of Obstetrics and Gynæcology of the British Empire

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# The Journal of Obstetrics and Gynæcology of the British Empire

VOL. XXVII. FEBRUARY, 1915. No. 2.


## The Alexander-Adams Operation and its Results.*


By D. G. MADILL, M.B.

*Ex-Assistant Master, Rotunda Hospital, Dublin.*


IN bringing forward the subject of the Alexander-Adams operation, I do not claim to be able to state anything novel with regard to it, but the results embodied in this paper of a considerable number of cases have been such as to justify, perhaps, a greater belief in the simplicity of the operation, and more confidence in its permanent benefit than is shown in the writings of many present-day surgeons.

Generally speaking, in cases of retro-displacement of the uterus where symptoms are present attributable to that cause, improvement in at least some of those symptoms follows correction of the displacement, no matter what suspensory operation is performed. This seems especially the case in a simple mobile retroversion, and the best operation for its cure is one which would bring the uterus into a forward position and keep it there, without interfering with its physiological mobility, and I believe this to be accomplished by the Alexander operation.

It is now thirty-four years since Alexander of Liverpool first performed the operation, some weeks before Adams of Glasgow performed the same operation on the living subject, though he had been experimenting for some time previously on the cadaver. In the years immediately following its description, it was practised by many surgeons, and the published reports of their cases do not show that their experience in general was a happy one. The cases were often unsuitable, and the results correspondingly bad; or the difficulty of finding the ligaments so great that the operation was abandoned by many after a very few attempts. In more recent years, though it is extensively practised on the continent, it does not appear to have gained in popularity in this country, and yet, in suitable cases, it seems almost the safest and most physiological of all the radical measures for the cure of backward displacement.

* Read before the Obstetrical Section of the Royal Academy of Medicine, Ireland.

I recognize the objections which have been urged against it, and in the course of this short paper I hope to show that some of the hostile criticisms are, at any rate, exaggerated, and that once the initial stage of unfamiliarity with the operation is past, it becomes one of the simplest and most effective in surgery.

*Indications.* The indications for the operation are important, because it has certain limitations, the overlooking of which by some surgeons in past years has led to inferior results, and has helped to build up this widespread prejudice against it. Roughly speaking, the operation is applicable to every case of simple, mobile retroversion of the uterus in the child-bearing period which is giving rise to symptoms. Under this heading, there would be excluded that type of case, mainly congenital, in which the retroverted uterus causes no symptoms, and in which it might be said that such is the normal position for the uterus for that particular individual. In this connection it is very important to satisfy oneself that the symptoms complained of in a young woman where a retroversion is present are caused *by* that displacement, otherwise a correcting operation will not improve matters. All cases where infection and adhesions are present are also excluded, and if any doubt exists regarding the presence of adhesions, I think it sound treatment to examine the patient under an anæsthetic, before deciding on the nature of the operation to be adopted. A third class of case to be rigidly excluded from the scope of the operation is that in which a retroversion is present, mobile or otherwise, where the chief complaint of the patient is sterility. In the treatment of this condition I think the Alexander operation has no place, because an opportunity of proper inspection of the appendages is denied. Old or very emaciated patients, though not necessarily excluded, would also be unsuitable subjects, because here the ligaments are so thin and weak as to be ineffective, and in such cases any suspensory operation by means of ligaments would probably have an unsatisfactory result. Notwithstanding the exclusion of these four types, there exists a very large class of patient whose chief complaints are menstrual disorders and sacral pain, and where on vaginal examination there is found a simple replaceable retroversion without any apparent tubal or ovarian trouble; it is to a patient of this kind that the Alexander-Adams operation is applicable, and when I look back on the numbers of such cases met with in the Rotunda Hospital during four years, I cannot admit that the limits of the operation are too narrow to impair its utility.

*Technique.* Although the technique is familiar, I think it is of the first importance, and I should like to emphasize a few points with regard to it, for the operation has been unjustly blamed by some because the finding of the ligaments seemed too troublesome

or uncertain, or for some other reason largely concerned with the technique. First of all, the uterus must be brought forward manually just before the operation, and possibly a gauze plug or pessary inserted in the vagina. If this is neglected, and an attempt made during the operation to draw up the uterus by pulling on the ligaments, an undue strain is placed upon them, especially on the thinned-out end grasped first at the external abdominal ring, with the result that the ligament frequently breaks off.

Having replaced the uterus, the question of incision arises. It is perhaps a minor point, but I think worth a passing reference. In the last fifty or sixty cases in which I have performed the operation, I used a transverse crescentic incision instead of the usual bilateral incision over each external ring. Having felt for and noted the position of the spines of the pubis, the incision begins about an inch above and to the outer side of the right pubic spine, ending at a corresponding point outside the left spine. With this incision, the view of the field of operation is at least as good as with the more usual bilateral incision; it does not extend as high up on the abdominal wall as do the inguinal incisions; it is consequently covered completely with pubic hair a few months later; and there is only one incision to stitch up.

With regard to the difficulty stated by some operators of finding the ends of the ligaments, that is occasionally a very real difficulty, but I believe that with a little perseverance with the operation, this difficulty would vanish. One of the chief obstacles to the finding of these ligaments is want of complete hæmostasis, and this is especially true in the case of a fat patient. If bleeding points are not properly secured, all the tissues get stained a uniform red colour, the frayed ends of the ligaments amongst the rest, so that it is impossible to differentiate them. Another difficulty is the ease with which the deeper layer of the superficial fascia can be mistaken for the aponeurosis of the external oblique muscle. This fascia is sometimes very dense, and if the underlying fat is thin, and the tissues blood-stained, the pillars of the external ring can be easily felt with the finger through this fascia; in such a case it is not hard to imagine an operator attempting to secure the ligaments in what he considers to be the ring, losing a great deal of time and temper, and finally giving up the operation in disgust.

Having exposed the aponeurosis, the loose connective tissue over it should be removed, and the pillars of the external ring defined. It is important to remember that in some cases the ring consists of a narrow slit, easily overlooked; in others, two or more triangular spaces are present, and lead to confusion. When the external ring is well cleaned and isolated, it will be noticed that what has been described as "a little knuckle of fat" protrudes, and the genital branch of the genito-crural nerve will be seen

emerging from the ring. The soft tissue deep to, and on the outer side of this nerve, is grasped in the point of an artery forceps, and this tissue is bound to contain the ends of the round ligament. It should not be grasped too deeply, because if this occurs, the fibres of the internal oblique muscle will also be caught and torn, sometimes causing troublesome bleeding. The tissue in the artery forceps is carefully followed up towards the inguinal canal, dissecting alternately with the sharp and blunt ends of the scalpel, and using gentle traction with the forceps at first, because the tissue covering the end of the ligament is adherent to the deeper structures, and excessive traction to free it results in tearing. Once this fascia is separated, the ligament ought to pull out easily; if it does not, the aponeurosis of the external oblique can now be split up over the canal for a distance of about half an inch, and after a little dissection (keeping always to the outer side of the nerve) the ligament should be readily found higher up, but if any difficulty arises here, it might be recognized by the presence of a small blood-vessel which seems to coil around it. When found, it is pulled out carefully, catching it with a pair of artery forceps at intervals as it emerges. Towards the upper and thicker end, the processus vaginalis appears in company with it, and I think it advisable that this should be incised, as an additional shortening to the extent of about an inch can be thus obtained. It is quite a safe procedure, no ill effect having followed in any case that I am aware of. A curious point, which has been noticed by more than one operator, is that if there is any trouble in finding a ligament, it is for some reason usually connected with the one on the right side.

An unfortunate occurrence which sometimes happens is that the ligament breaks off at its thicker part when the uterus is pulled up. Even allowing for the fact that the ligament is sometimes small and thin, this accident should not happen. It generally means that an altogether unnecessary pull has been made when the uterus was already close up to the anterior abdominal wall, and the arrival of the uterus in that position can be easily recognized by the sudden stoppage of the feeling of elasticity which the pull on the slack ligament imparts to the hand, and the ligament at once becoming taut. If it does break, I believe it to be a mistake to split up the inguinal canal hunting for the torn end; it involves time, it weakens the canal, and the chances are against the search proving successful. I consider it a safer and better procedure to open the abdomen at once, ligate the torn end, and perform ventral suspension.

With reference to suture materials, although I have mostly used catgut, silk is possibly better for stitching the ligament to the aponeurosis; and for the skin I have always used a subcutaneous and subcuticular silkworm gut suture, following the practice of Dr.

Jellett, whose practice I have followed in the technique as a whole. This suture is of advantage mainly for cosmetic reasons, because there are no stitch-hole scars, and six months later the operation scar is practically unrecognizable.

If a pessary has not already been inserted in the vagina, I believe it to be advantageous to do so now, and allow it to remain *in situ* three or four weeks.

*Results.* I now come to the results of the operation, and in endeavouring to estimate these, I communicated with about eighty of the earlier patients, ignoring all those upon whom I had operated later than October 1913, and I received replies from forty-seven. In following up these cases, I tried to confine my attention as much as possible to those in which the Alexander-Adams operation alone was done in combination with curettage, the latter being necessary on account of the symptoms of endometritis from which all these patients suffered. It is easy to understand that the pathological condition causing the displacement was associated in many instances with some perinæal or vaginal lesion; in such cases the Alexander operation alone would have been insufficient, and a vaginal repair operation was done in addition. This does not in any way lessen the value of the operation; on the contrary it extends its limits, for these auxiliary measures would have been of little use without the Alexander operation.

*Mortality.* Although over 200 patients have had this operation performed in the Rotunda Hospital during the past four years, there has been only one death, and that from causes entirely unconnected with the operation. This patient showed symptoms of uræmia within a few days of the operation, and at the post-mortem examination very small granular contracted kidneys were found. With such a record, I think it is safe to say that there ought to be no mortality.

Of the forty-seven patients from whom I received replies, thirty-four had curettage and the Alexander operation performed; nine had curettage, amputation of cervix, and Alexander; and four had curettage, amputation of cervix, perinæorrhaphy, and Alexander. The first class more nearly illustrates the effects of the operation, because the symptoms complained of by these patients were in all probability directly due to the malposition of the uterus. As a whole, they complained of the usual symptoms of menorrhagia or metrorrhagia, leucorrhœa, and backache; cases complaining of sterility are not included. Of these thirty-four patients, twenty-eight replied that their periods are now regular every month, and are not excessive; three said that they came on every three weeks, and sometimes every fortnight; two said that the periods were still irregular and scanty (in these two cases the uterus was of the infantile variety); and one made no comment at all on her periods.

That is to say, excluding the two cases of infantile uterus, twenty-eight out of thirty-two, or eighty-seven per cent., reported themselves as being normal in their periods since the operation.

*Leucorrhœa.* With regard to this symptom, sixteen reported that they had no discharge, that is, nearly fifty per cent.; fourteen said that they had it slightly still, but a good deal less; and in two cases there was no change.

*Menstrual pain.* Menstrual pain was a symptom in only about twenty cases; four said they still have some pain; one said the pain was no better; and in the remaining cases there was no pain, or it was so slight as to be negligible.

*Intermenstrual pain.* This was a cause of complaint in ninety per cent. of all the cases, in some patients the main symptom, pain in the back and left side. Twenty-six out of the thirty-four stated that they were now free from this pain, that is, over seventy-five per cent., the remainder either ignoring the question, or else reporting that there was no change. I consider this result of some importance, not indeed as a recommendation in favour of the Alexander-Adams above any other method of uterine suspension, but when we consider how prevalent among women is the symptom of backache and sacralgia, it goes to prove that much may be done for the complaint in suitable cases by a suspensory operation.

I did not find any marked change in constipation, only nineteen out of the forty-seven reporting themselves as improved in this respect, and whether in those cases it was due to the operation or not, I cannot say. I found almost no abnormal symptoms referable to the bladder in my results, only one single patient having complained of anything disagreeable in that way, and her complaint was pain on micturition for a fortnight after the operation, but on questioning her, I found that the pain had been low down at the urethral orifice. I was particular to ask this question about bladder symptoms, because, rightly or wrongly, the Alexander operation has been blamed for subsequent frequency of micturition, due to the excessive pulling down of the uterus on top of the bladder. I think it has been wrongly blamed.

In the question of improvement or otherwise in the health taken as a whole, I got, perhaps, the most striking testimony. In only two cases out of the thirty-four did I find that the general health was not improved, the others, ninety-six per cent., emphatically stated that they felt much better and stronger, an excellent result for any operation.

Such were the effects so far as previous and subsequent symptoms are concerned of the patients on whom curettage and the Alexander operation alone were performed, and they are obviously the most typical. The remaining patients had some vaginal repair work done as well, and it is impossible to say how far the improve-

ment in their symptoms was due to the Alexander operation or to the vaginal repair, so that I shall not refer to them further than to say that they all reported themselves as feeling much improved in health.

The Alexander-Adams is an operation singularly free from complications, though instances of hernia, pain in the wound, and suppuration have been reported. I have not been able to discover a case of hernia resulting from the operation, and I think those cases in which it has occurred must have been due to an extensive splitting up of the inguinal canal, perhaps on the effort to find the end of a torn ligament. With proper technique and asepsis, hernia ought not to occur.

Pain in the wound resulted in some of my earlier cases. I do not mean a painful cicatrix, but pain on one or other side radiating down to the vulva, and tender on pressure. I believe that to have been due to the inclusion of the genital nerve when stitching the ligaments, and since becoming more careful about the isolation of this nerve, I have not come across any case of the kind.

Suppuration, of course, ought to be absent with proper asepsis, though it used to be a frequent complication some years ago. Possibly a reason for its appearance was the fact that in the course of the operation different layers and spaces are opened up, and if a small bleeding point is left untied, these spaces become distended with blood, and suppuration is very probable. I have experienced a few cases of superficial hæmatomata, which ought to have been avoided, but fortunately they were recognized and treated in time. If the wound does suppurate, it is likely to be disastrous for the operation, as the ligaments become released from their attachments, and the uterus falls back. This is one of the reasons why the advocates of a bilateral inguinal incision prefer that method to one transverse incision, because in the former case suppuration is likely to affect only one side and one ligament, leaving the other secure to hold the uterus in a position of anteversion.

I now come to the last, and, perhaps, the most important result, namely, the effect of pregnancy upon the operation, and the effect of the latter upon pregnancy. Of the patients from whom I received replies, sixteen had become pregnant, and two are now pregnant. As far as I can discover, these sixteen patients delivered themselves of healthy children at full term. I regret that I had an opportunity of examining only seven of these patients after confinement, and in six of them I found the uterus in good position; in the seventh case, the uterus was in what one might call a state of partial retroversion, either the ligaments had not contracted in the usual way with the involuting uterus, or else they had not been pulled taut at the time of operation. These patients all told me they had good health during their pregnancy, and did not suffer

any ill-effects from the operation, a report which I was very glad to hear, because some cases have been published of pain in the wound from traction on the ligaments during the expansion of the uterus. Of course, seven cases are too small a number on which to base an opinion of the result of the operation after confinement, but so far as they go, they afford evidence that the uterus remains in good position. I considered this point so important that I did all I could to induce these patients to return for examination, and I regret that so few responded, but there is no reason to believe, from the symptoms described by the patients, that the uterus retroverted again in any of the other cases.

Of the patients who did not become pregnant, I had an opportunity of seeing a fair number from time to time in the extern at the Rotunda Hospital. I remember two cases in which I found a return recurrence of the displacement, but as these were amongst the first cases of the kind operated upon, I attribute the recurrence to insufficient experience of the technique.

To sum up this paper, I would say that the Alexander-Adams operation is indicated in cases of simple, non-adherent retroversions giving rise to symptoms, with the exception of those whose complaint is sterility.

The technique is simple, and if reasonable care be taken, the ligaments are easily found.

The operation ought to be free from subsequent complications, and there should be no mortality.

Over eighty-five per cent. of the patients were cured of menorrhagia and metrorrhagia, and over seventy-five per cent. of intermenstrual pain.

There is no trouble during pregnancy, and evidence tends to show that the uterus remains in good position after delivery.

I do not mean in this paper to imply that the Alexander operation is always the best for cases of mobile retroversion. I am aware that other suspensory measures have found greater support amongst surgeons, and I have not had sufficient experience of the results of those other measures to form an estimate as to which is the best operation; besides, such a comparison would be outside the scope of this paper. I have simply followed up the after-histories of a number of these patients, and I think the results justify me in saying that in suitable cases the Alexander-Adams is a good operation; that the benefit obtained from it compares favourably with that obtained from other suspensory operations; that its limits are not so narrow as is sometimes thought; and that it has been rather undeservedly condemned by many operators.

In conclusion, I should like to thank the Master of the Rotunda for granting me facilities and permission to report these results.

# A New Obstetrical Forceps: the "Forceps Fennica."

By S. E. Wichmann, M.D., Helsingfors.

The story of the development of obstetrical forceps during the three past centuries is undoubtedly one of the most interesting fields in the whole history of obstetrics. It establishes as clearly as possible the slow progress made during centuries, it shows how even the slightest gain in the construction and use of the forceps has placed the inventive ability and clinical experience of obstetricians to the hardest test, and finally it demonstrates above all in a striking way how full of misunderstandings and mistakes the development has been and how in every new discovery, even in the best, only some new thought more or less clearly expressed has on later investigation been productive and true.

As it is my intention in this treatise to give an account of a new forceps model of my own construction, it would be highly attractive to deal with the historical development of the forceps, but this would take me beyond the limits of my paper. I must therefore content myself by giving an account of the most important deficiencies in the forceps models used up to the present, especially in the so-called axis traction forceps, partly on the basis of theoretical reasoning and partly in connection with the practical clinical experience I have been able to gather with the above-mentioned instruments.

*The Deficiencies of the Axis-traction Forceps.*

The most important objections of a general nature which have been made against the prototype of the modern axis-traction forceps, Tarnier's forceps, are that it is unnecessary, far too complicated and too expensive.

The last objection can be discussed and assumes importance when another and cheaper model satisfies just as completely as Tarnier's forceps all the demands which nowadays are put on an axis-traction forceps.

That the axis-traction forceps is unnecessary was a fairly general objection previously, and even in our days writers are met with in German literature[1] who do not consider it a practical and appropriate invention. This unwarranted and now almost unanimously rejected verdict was provoked to a great extent by Tarnier himself by his sharp condemnation of the ordinary forceps. He affirmed and endeavoured to prove that with the latter instrument traction in the axis of the genital canal could not be made even in

the lower pelvic cavity without the loss of much energy. He therefore recommended his forceps both for high as well as for quite low applications. As however daily experience clearly showed that the ordinary forceps did its duty in low applications with ease and without injury, one was necessarily brought into collision with Tarnier's theoretical assertions and was therefore ready *a priori* to call in question even his theories of the advantages of traction apparatus in high applications.

Especially was his demand criticised that a good axis-traction forceps must and can have an indicator ("aiguille indicatrice"), in order that traction can always be carried out properly in the direction of the pelvic axis. Tarnier constructed his traction attachment in such a way that the supporting point of the handle-bar came to lie in the axis of the blades of the forceps, as the ends of the traction-rods were about 1 c.m. beneath the handles. By constantly keeping this distance during the tractions one came, according to Tarnier, to draw "mathematically correctly" in the direction of the pelvic axis during the whole operation. Already in the same year (1877) emphasis was laid upon the fact, but from another quarter (among others Fochier[2]), that the traction took place in the axis of the blades, but in the direction of the pelvic axis only in the case of the latter's coinciding with the former. This could only come about if the forceps were applied in the transverse diameter of the pelvis and if the handles of the forceps were strongly forced in a backward direction. The necessary degree of this backward forcing of the handles in each separate case, dependent on the inclination of the plane of the pelvic inlet, the degree of concavity of the upper part of the sacrum, etc., must be calculated; it cannot be fixed in a mathematically correct manner but can only be approximately estimated by long experience. If the forceps, on the other hand, be applied in one of the oblique diameters all thought of the handles of the forceps acting as an indicator must be given up, as if the blades of the forceps be applied fairly correctly round the head of the infant, the handles of the forceps must swerve considerably towards the femur, towards which the concavity of the pelvic curve is directed, and the traction-rods must therefore be more or less considerably removed therefrom in order to render it possible to effect traction in the sagittal plane. One must therefore give up seeking to effect traction with mathematical correctness in the direction of the pelvic axis and by reason of this, the only one of Tarnier's theoretical points which was new has been proved to be untenable as such in practice.

On the other hand it was soon discovered that, in using Tarnier's forceps the force necessary for the extraction of a high standing head was obviously much less than with any ordinary form of forceps, and that therefore practically taken a traction

running in the direction of the pelvic axis was in any case possible with Tarnier's forceps.

From different quarters the fear was expressed that, with this traction attachment, too much strength was apt to be applied thereby causing injuries, especially to the maternal tissues.

It would seem difficult to see how one should happen unconsciously to draw more strongly on the traction-handles than on the stout handles of the ordinary forceps. It appears to me that the apprehension expressed by the older obstetricians is explained by the fact that those accoucheurs who with the classic forceps were accustomed to use considerable strength in high applications were afraid of the effects which would be produced by the same strength in its entirety applied on the traction attachment. It has always been correctly pointed out in discussions on this point that a too brutal development of strength is possible in a much less degree with the more lightly constructed traction attachment than with the strongly constructed handles of the ordinary forceps.

The most important and most justified objection to Tarnier's forceps is that its whole construction is complicated, that the forceps itself and the handles are heavy and that cleaning, by reason of the uneven surfaces of the many sharp-edged small parts, is rendered very difficult. And the correctness of these objections to Tarnier's forceps compared with the ordinary forceps must be admitted. This is a highly noteworthy disadvantage when, as in this case, it is a question of an instrument which must be used under the most different and often most unfavourable circumstances. It must be admitted that deviations from the usual type of forceps with all their attendant apparatus can occupy far too large a part of the operator's attention, thus taking it away from the operation itself and destroying the regular course of the latter. In order to avoid that danger and accustom operators to the forms of forceps armed with a traction attachment nearly all inventors of such have recommended their models to be used in all, both high and low, forceps operations. It has, however, up to the present proved impossible to get such a reform carried through, because, as above stated, the advantages of the simple types of forceps in the case of low-lying heads have been so striking that hardly any one has wished to use the less suitable instruments in those cases, which in practice are the majority. The obstetrician has therefore almost everywhere fallen into the hardly pleasant situation of always requiring to have at his disposal, and of being obliged to take to every confinement case which has not been previously examined in detail, not only the ordinary forceps but also that provided with a traction attachment.

A form of forceps which could unite in itself the best qualities of the "low" and "high" forceps would consequently be highly

desirable for the obstetrician in that the experience and dexterity he could gather in using it in "low" applications would be of direct service to him with the difficult "high forceps," if he could make use of an instrument with which he is thoroughly acquainted. It is just such an instrument I have wished to devise.

The more recent forceps models with which one has hitherto attempted to attain the above-mentioned end must all be characterized as more or less complete failures. They have not been able to gain any further ground. An attempt to apply shoulders to Tarnier's forceps, between the lock and the fixation screw, and thereby connect it into a so-called low forceps, cannot be considered to be any solution of the problem. For these shoulders, which certainly are much more favourably situated than the outward bends* at the ends of the handles, are in any case in Tarnier's forceps, owing to the length of the shanks, far too much removed from the infant's head to be used with advantage in the extraction of a low-standing head.

On the other hand in all the models of forceps (English and German) where attempts have been made to bring a traction attachment on shorter forms of forceps, such attachment has come to constitute a great hindrance for operations with a low-standing head. With all these modifications (A. R. Simpson's, † Felsenreich's, Sänger's so-called "deutsche Achsenzugzange," V. Herff's, etc.) there has been even less possibility than with Tarnier's forceps of comfortably being able to remove the traction attachment during the operation, and thereby rendering the forceps more easily to be handled for the latter part of the operation. In order to be able to have at one's disposal at the commencement of the operation the advantage of a traction attachment properly constructed according to generally prevailing principles, one has had in practice to take into the bargain as a useless addition, the trouble attendant upon the same in the extraction of the infant's head from the pelvic cavity.

* The appearance of these outward bends in a majority of even the most recent forceps models (in Tarnier's forceps they run about 3 cm. outwards in a right angle) appears to me to be quite an interesting relic of the past, in that these have been maintained (even in the axis-traction forceps, although absolutely superfluous additions) since the times of Chamberlen and Levret, despite the fact that on certain occasions, as in the crossing of the handles, they are a direct hindrance.

† A. R. Simpson has united the whole traction attachment into one irremovable piece with the left traction-rod, so that the former "may not be lost." Merely the application of the left forceps branch as the first is always necessary (left-lower first as stands engraved on the handles), and the whole of the most important and most difficult part of the operation, the putting in and fixing of the position of the forceps, is rendered highly difficult.

How strongly the necessity of a forceps, suitable for applications at all heights has been felt among obstetricians can be seen, apart from the above, from the large number of separate traction pieces which have been constructed in the course of years for free application in ordinary forceps. Especially in England and America have many such been made, usually hard angular traction pieces in order readily to be united with the forceps as a rule at the top of the lock (Lusk,[3] Taylor-Morgan,[4] Le Page, and others). Mechanically their action in the case of a high-standing head can be compared with the forceps constructed by Hubert, and they must therefore be considered quite unsatisfactory as axis-traction forceps.

By a new construction of the lock whereby the traction attachment is united with the traction-rods, it has been possible for me in a second to apply and again withdraw the traction attachment in every phase of a forceps delivery without specially having to remove the traction-rods from the forceps shank. By this I consider that the chief difficulty in our search for a "universal forceps" is removed.

If, on the one hand, it must be emphasized that the traction attachments, which have been made up to the present, are highly complicated in their construction and use, on the other hand it must also be admitted that in their most developed form, in the latest Tarnier model, they have gained a very satisfactory power of acting. This latter attachment, according to the experience gathered during the last decades, practically rendered possible in all forceps applications a traction in accordance with the pelvic axis. This is due to the two perpendicularly moving joints which Tarnier introduced into his last model in 1882. The advantage of this free movability is lacking, as far as I have been able to observe, in all the later modifications (A. R. Simpson, Felsenreich, Sänger, v. Herff, and others), and these are, therefore, in my opinion on a lower plane as axis-traction forceps. If one imagines for example A. R. Simpson's forceps applied obliquely to a head in the pelvic inlet, the traction applied to the handle-bar will almost act on the anterior traction-rod and thereby on the anterior forceps blade. Now, as the traction takes place in a downward direction, and as there is no complete movable joint in that direction in the obliquely lying traction attachment, the pressure forces the anterior blade to sink, and the traction therefore produces as the first effect a rotation of the forceps around the head and thereby an injury to it. This traction attachment therefore acts satisfactorily only when the forceps in the pelvic inlet is applied in the transverse diameter, that is, not correctly on the infant's head. In my instrument I have made use of the advantages which Tarnier's traction attachment possesses in this connection.

Quite apart from the traction attachment, the characteristic part of axis-traction forceps, a number of justified objections have been made especially against Tarnier's forceps. First and foremost the forceps is large, far too large for low forceps applications, which much more advantageously can be carried out with smaller and lighter models. Especially complaints have been made as to the weight of the massive handles, in that they, after the forceps has been applied to and fixed round the infant's head, tend to sink downwards, whereby they dislocate or injure the head and prevent the same during the passage through the pelvic canal from being able freely to carry out the movements consistent with the natural mechanism of delivery. By making the handles of the forceps hollow or lighter this objectionable aspect of Tarnier's forceps has been successfully counteracted in a number of forceps models (*e.g.*, Simpson's).

Quite justified objections have even been made against the all too large dimensions of the French (v. Siebold's) lock in Tarnier's forceps. The screw ring, about 3 cm. broad and almost as high, which rises from the left blade is indeed quite a considerable hindrance when, in the case of a high-standing head, the head's progress has to be controlled during the first stages of traction. It has also seemed to me very inconvenient in crossing the handles, as in carrying over the right handle to the lock it must be raised about 3 cm. above the level of the left handle. Hereby a more or less considerable dislocation of the right forceps blade, which is situated high up in the genital canal, cannot be prevented, which in the small space can often be very risky.*

Another inconvenience of the French lock appears to me to be due to the necessity that every time between the pulls the lock must be unscrewed. All these objections are avoided in the forceps models in which the English and German locks, simpler but just as secure, have been used.

Criticism directed its most violent attack against Tarnier's forceps models on the fixation screw which Tarnier incautiously termed compression screw (" vis de pression "). Despite the fact that Tarnier[5] in his first publication specially emphasized that the forceps blades should be fitted round the infant's head manually and their position should be subsequently fixed by the said screw, one was misled by the name into fearing a compression by the screw which would be dangerous to the infant's head. By leaving

* A dislocation of the blades in the genital canal during crossing is also caused in using Tarnier's forceps by the unnecessary curved handle ends which run out 3 cm. The direction of this dislocation is obviously perpendicular to the above mentioned one. The excursions of the end parts of the right forceps blade are therefore quite considerable in the whole crossing.

out this screw (Breus, Sänger and others), or by removing it nearer the lock (A. R. Simpson), it was endeavoured to avoid the supposed danger.—It ought, however, to have been clear to everyone that by means of Tarnier's so-called compression screw, which properly ought to have been called fixation screw ("vis de maintien"), any injury to the infant's head could not be done as long as the above-mentioned *modus operandi*, clearly described once for all by Tarnier, was followed. An injury done by the forceps blades can only be caused by reason of a disproportion between the size of the head and the width of the pelvic canal and during too strong traction, which serve to overcome the resistance. In suchlike cases I, on the other hand, would consider that the fixation screw would be a certain, perhaps even very important, protection against a compression by the forceps blades, for if, for example, one can imagine the Breus forceps used in cases of stronger resistance, in powerful traction on the shoulders there would be a still greater pressing together of the forceps blades round the head, the stronger the force exerted.

Although Bumm[6] had previously pointed out how unjustified this fear of the "compression screw" was, obstetricians in Germany continued to fight shy of it. Especially were endeavours[7] made to show that rotation-movements of the fœtal head within the blades, during extraction, were impossible.

If Tarnier's screw is used as a true fixation screw, it ought not to constitute any danger for the infant's head. The case can, however, be different if, for example, by reason of a too slightly marked cephalic curve in the forceps, it is considered necessary actually to compress the head between the blades in order to prevent the forceps from sliding during the operation. The fault of an eventual harmful compression will therefore fall entirely on the operator and the too slightly marked cephalic curve, and not at all on the fixation screw.

Indeed in a number of forceps models, specially French, such as Tarnier's, Demelin's and others, complaints[8] have often been made about their cephalic curve, which would cause the repeatedly observed total vertical sliding of the forceps during traction. By introducing a greater cephalic curve attempts have been made, and indeed with success, to lessen the above-mentioned danger (*e.g.*, A. R. Simpson).

On the other hand the objection has been raised against a too strongly marked cephalic curve that the forceps catch the head only with the distal ends, not with the centre of the forceps blades and that thereby, as the surface of contact between the forceps and the head is lessened, the danger of lesion for the infant's head is increased. This should be the more injurious the larger the cephalic curve, because every forceps at the acme of a pull glides

more or less on the infant's head, and in this dislocation the ends of the forceps come in contact with a larger diameter of the head than that originally caught. Even if this sliding is quite inconsiderable the blades of the forceps are forced apart, the convex surfaces of the blades are pressed against the pelvic walls and, by their resistance, the pressure reacting on the infant's head by the instrument is increased.

These views, specially supported in recent times by Demelin,[9] have led that author by modifications of Thenance and Chassagny's uncrossed forceps to try to avoid the supposed deficiencies in the crossed forceps. By making the forceps convergent on the blades it has been possible to lessen the cephalic curve, and in any case to assure a good hold round the infant's head. In opposition to some authors he believes he has been able to avoid the above-mentioned dangers of sliding and compression. On a closer examination of Demelin's directions for using his forceps it is evident that the fixation screw is in reality used as a compression screw, for he recommends that after the two halves of the instrument have been closely apposed, the screw be given an extra complete turn. This pressure, as a result of the inconsiderable cephalic curve, has the effect of chiefly compressing the easily fractured bones of the cranial convexity, while forceps with a larger curve for the head catch more the bones of the face and basis cranii which would probably stand a compression better.

If it appears easy to attack Demelin's theories, it is not thereby said that his forceps is unsuitable in practice. The relatively simple construction, in spite of an incompletely acting traction attachment consisting of bands, ought to assure it a certain prevalence of use in its country of origin.

## The New Forceps.

If the so-called axis-traction forceps has reached a high degree of mechanical development and power of action, it should be apparent from the above-mentioned facts that there are a number of deficiencies even in the best of them, and that attempts to perfect them are still necessary. Above all, endeavours ought to be made to construct a form of forceps which in itself will unite the best qualities of the so-called high and low forceps.

In the following I beg to give an account of a new forceps model in which I have endeavoured to avoid the defects and at the same time to introduce the desirable points mentioned above.

I have made the following conditions necessary for its construction :—

1. The whole forceps must have as smooth and simple surfaces as possible; its structure, and especially its handles, must be light.

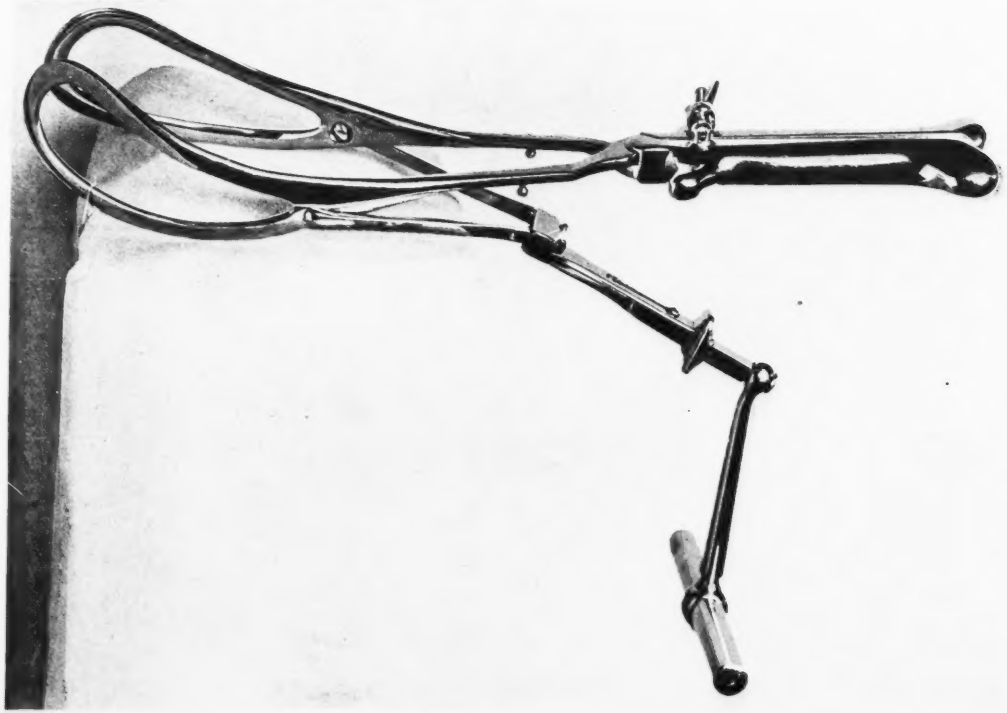

Fig. 1.
" Forceps fennica."

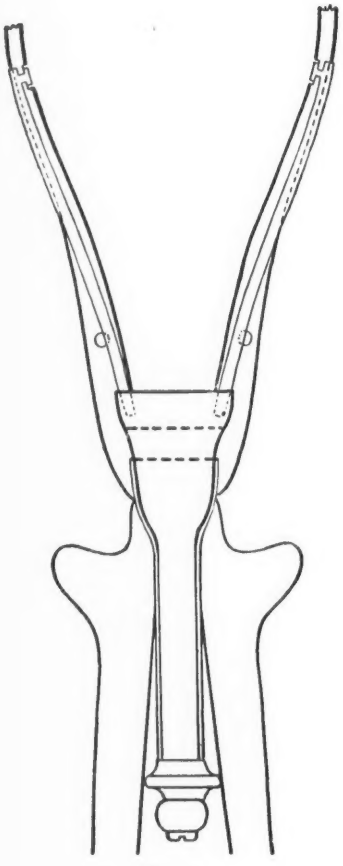

Fig. 2.
Socket enclosing the ends of the fixed converging traction-rods.

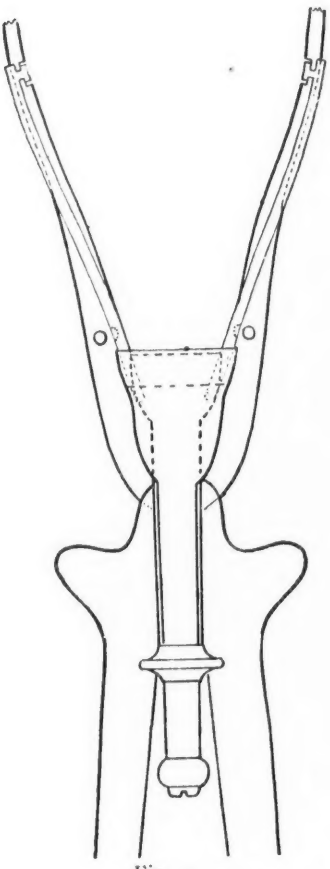

Fig. 3.
Traction-rods free, fastened on to the traction-attachment.

2. It must be able to be used for a low-standing head at least just as advantageously as the best so-called low forceps, *e.g.*, J. Simpson's and Naegele's.
3. It must be able to be used for a high-standing head at least just as advantageously as the best so-called axis-traction forceps, *e.g.*, Tarnier's and A. R. Simpson's.
4. The traction attachment must always, even during the operation, be able to be put on and taken off in a second by means of an automatically acting lock so that thereby the low forceps becomes an axis-traction forceps and *vice versa*.

In order to be able to carry out conditions 1 and 2, I selected a model closely reminding one of Simpson's forceps (Fig. 1). The simple English lock and the smooth surfaces render cleaning easy and best spare the soft parts of the mother. This lock obviously does not constitute any hindrance, as the French lock, for crossing the branches, and it has even appeared to me always to act more smoothly than the French lock during the closing of the lock in high applications. In order to begin that important part of the operation one requires to have the blades placed only approximately diametrically, as the oblique articular surfaces guide them gradually to seek the exact position round the head, while the operator can clearly perceive every resistance which can be made and thereby be prevented from using force. The corresponding part of the manœuvre with Tarnier's forceps must either be carried out without the guidance of the lock or the forceps must be locked before the branches are absolutely parallel with the help of the screw. In the latter case no feeling of resistance to the movements of the blades can be perceived, the parallelizing of the same takes place on the spot, the resistance is overcome with the help of the screw and lesions of the infant's head can more easily arise.

Apart from introducing the English lock, crossing is to some extent facilitated by reducing as far as possible the branched ends of the handles. I did not wish to remove them entirely, because they give a welcome support to the little finger when applying the blades, and secondly because with a height of 1–1½ cm. they are a less hindrance during crossing than the 1½ cm. high shoulders (Fig. 4).

These shoulders are obviously necessary in order that the forceps may be used as comfortably as possible in low applications. By reason of their shortness they have not proved any obstacle even in the highest applications, and their rounded form excludes the danger of lesions of the outer genitalia. Placed about 1½ cm. from the lock they are sufficiently near it to allow the middle finger during tractions on a low-standing head to rest comfortably on the lock between the shanks.

By having the handles made hollow I have endeavoured to

reduce their weight as far as possible and at the same time retain a suitable shape.

The shanks are so constructed that the outwardly projecting part, intervening between the point where they leave the lock and the point where they become parallel, is bent; on the right side the bend is downwards, and on the left side, upwards (Figs. 5 and 6). Thus the parallel parts come to lie on the same level, and the proximal ends of the traction-rods, when applied to the under surface of the shanks, also come to lie at the same level; this, as will be seen later, is of special importance in joining them to the traction attachment. I have made that part of the shanks, which runs from the point where they cease to become parallel to their junction with the blades, less strongly curved than in some English models, and more in the shape of a bow (Fig. 4). My reason for this is that I consider the proximal parts of the blades in such a model as Simpson's for example, as too broad and liable to cause excessive distension, and even rupture, of the vulva. While the proximal part of the cephalic curve of the forceps has been somewhat reduced, its greatest width has been practically retained at Simpson's measurement, with 8.2 cm. Even the distance between the tips of the blades is the same, 2.5 cm. With this cephalic curve, and by observing the above given conditions for a correct use of the fixation screw, I have not been able to observe any tendency for sliding. This degree of curvature also appears to me to be very convenient for introducing the blades.

The relatively low pelvic curve in some of A. R. Simpson's models, 7–7½ cm., I have lessened to 6–6½ cm., as compared with other models (Tarnier 8½ cm.; Naegele 9½—10 cm.). During my operations with forceps and experiments with forceps of different pelvic curves, it has seemed to me as if applications in the oblique diameter in cases of high-standing heads are rendered specially difficult when forceps have a high degree of pelvic curve. This is also easily explicable theoretically.

If one imagines the Tarnier forceps applied to the head at the pelvic inlet, so that the blades lie in the antero-posterior diameter of the pelvis, the handles deviate markedly to the side corresponding to the concavity of the pelvic curve. The higher the head the greater will be the deviation, and the labia or ischial rami form an obstacle to the correct application of the blades to the head. If, on the other hand, the handles are made to lie in the sagittal plane, the higher the head the more do the tips of the blades deviate to one side and come into contact with the wall of the uterus.

The best axis-traction forceps, Tarnier's and Simpson's, are constructed with the idea of applying them in the transverse diameter of the pelvis: in such a case their pelvic curve is suitable, but when they are applied in the oblique diameter they are not so

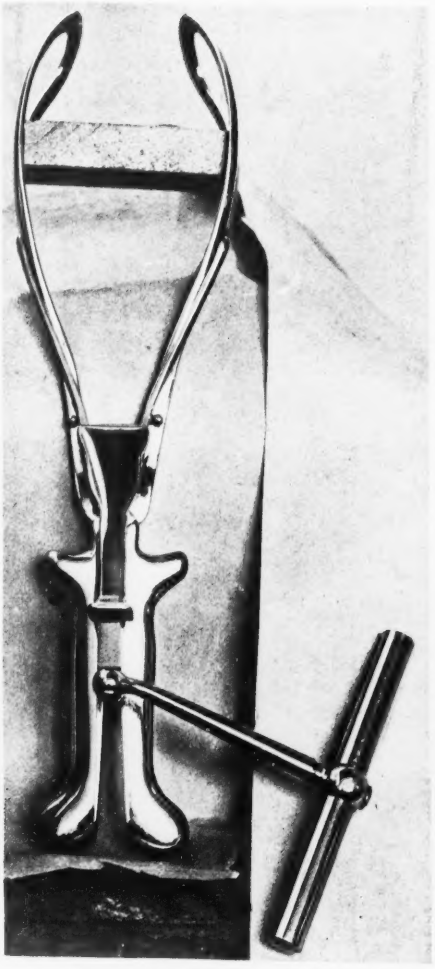

Fig. 4.
The socket pressed against the shanks; the traction-attachment is ready to be removed.

Fig. 5.
The left blade.

Fig. 6.
The right blade.

suitable. But, as in actual practice, one is nearly always compelled to apply them in the oblique diameter, a lower degree of pelvic curve seems desirable. Further, a low degree of pelvic curve is also suitable when the head lies low in the pelvis. In planning the pelvic curve of my forceps I have taken their satisfactory application to a high head in the oblique diameter of the pelvis, as the standard to be attained. A pelvic curve of 6–6½ cm. has been found the best.

The fixation screw is somewhat different from Tarnier's and Simpson's models. It is situated about 2½ cm. from the lock (in Tarnier's forceps 3½ cm.; in A. R. Simpson's 2 cm.), therefore about 1 cm. proximally from the traction surface of the shoulders. As the screw itself is only 3½ cm. long it cannot be any obstacle to the application of the fingers on the shoulders, be it closed or open (Fig. 5). The screw is besides movable only in the frontal plane of the forceps—not in the horizontal plane (A. R. Simpson), or in all possible directions (Tarnier)—so that it always will rest behind the shoulders. It falls naturally into the place where it is least in the way during traction. By this simple arrangement the use of the fixation screw has been made much more convenient than in Tarnier's forceps. In low applications where the screw does not need to be used it is no obstacle for the convenient carrying out of the operation. In high forceps operations, after the blades have been applied and the screw thrown over into its socket, I have only to give the screw nut some strokes of the finger so that it comes in contact with the socket. There has been no question of any further screwing. No tendency for sliding in this mode of procedure has been observed by me, although quite a high degree of movability for the infant's head within the forceps has been retained. For example, in a forceps application to a head lying high in the pelvic cavity, during traction with a fixed screw, I have observed quite a considerable rotation of the head within the forceps!

In the construction of the traction attachment for my forceps I have deviated from the most perfect models of Tarnier's forceps. In 1882, when Tarnier issued his last model of the traction attachment, he spoke of the desirability of being able to simplify that apparatus, "mais c'est là un premier modèle que je voudrai rendre plus simple ce qui, je l'espère, ne sera pas tres difficile a réaliser, si j'en juge par quelques essais en voie d'execution"[10] (p. 412). A simpler, and at the same time better, model has not yet been found, notwithstanding that the weak point in question in Tarnier's forceps has generally been recognized (*e.g.*, Bumm, l.c., p. 2291).

In Tarnier's forceps the traction-rods are inserted into the inner sides of the blades. I have caused the traction-rods to be inserted into the outer sides of the blades, and have found a simpler, so to

say automatically acting, lock for the traction attachment. The proximal ends of the rods can be fixed to the under surface of the shanks by rounded metal pins (Figs. 1–6). There is a groove on the outer surface of the blades for the reception of the rods; this groove allows the rods free play, and when loosened from the pins on the shanks they can readily drop in spite of their convergence brought about by the fixation of the traction attachment.

In principle, the fixation of the traction attachment is much the same as in Tarnier's forceps. The socket is broader so that it can enclose the proximal ends of the traction-rods, in their fixed position under the shanks, to the extent of about 1 cm. of their length. When the socket is pushed upwards along the ends of the traction-rods, to the extent of $1\frac{1}{2}$ to 2 cms., it tends to force the rods together and disengages them automatically from the metal pins on the under surface of the shanks. By a lock in the form of a bolt, as in Tarnier's forceps, the traction-attachment can then be fastened on to the rods, and traction can be commenced at once.

After the traction attachment has done its duty and the infant's head is on the bottom of the pelvis, the attachment is removed as easily and simply as it is attached. The socket is pressed against the lower surface of the shank so that the proximal ends of the traction-rods lie between the metal pins (Fig. 4). The bolt is opened and the socket is drawn out, whereby the traction-rods of themselves become fixed between the metal pins. The remaining part of the operation is as with an ordinary forceps: the fixed traction-rods are no obstacle.

By certain small alterations in the Tarnier bolt apparatus it has also been possible for me to unite in a moment and again remove the traction attachment. With its short handle-bar, its exceedingly simple movements and few screws, my traction attachment is very easily managed. The smooth surfaces and rounded edges exclude all possibility of any lesion in the maternal parts and facilitate cleaning.

By reason of the above-mentioned facts I consider that my new forceps model fulfils all the conditions set down by me above for a forceps which can claim to be used in all possible forceps operations just as advantageously as the earlier models together. For as a high forceps, it unites the best qualities of Tarnier's and Simpson's models, and by its relatively small pelvic curve ought to be considerably easier to apply correctly on a high-standing head; and as a low forceps, it is every bit as convenient as the best previous moleds since the fixed traction-rods (which, by the way, can be completely removed) do not constitute the slightest obstacle for an ordinary low application.

As a result of the introduction of the new traction attachment it can be laid down that no obstetrical specialist or general

practitioner requires to have two instruments. Everyone can always use the same forceps and in easy cases can acquire the facility in using the instrument which he requires in the difficult high applications. From the economic side the price of the new forceps obviously will be much lower than the prices of a high and low forceps together.

I must still mention in a few words an advantage which has been gained by my new forceps model. Both in the German and French manner of placing the forceps in the pelvic inlet, the forceps as a result of the strongly-marked pelvic curve has not correctly seized the infant's head in the majority of cases, and after the latter has subsequently been drawn down into the pelvic cavity it has often been deemed desirable to take out the forceps and reapply it in a better position, whereby according to Lusk[11] and Thomas[12] the high forceps has often been exchanged for the low. Of the approximately 200 so-called high forceps deliveries which have, during the last twenty-five years, been carried out in the Maternity Hospital at Helsingfors, there have been deviations from this mode of procedure in only a score of easier cases in which the operation was carried out with Tarnier's or Simpson's forceps. As a rule two forceps have been used in an operation. Objections have certainly been made to this mode of procedure, and although it is possible to manage with the high forceps in the pelvic outlet, nevertheless the desirability of a change of forceps has remained a fact. The convenient execution of the operation has been first rendered possible by my new model.

There is still another advantage. As has been previously stated I have been able to establish in my forceps operations that with my forceps, thanks to the less pelvic curve, I have been able with greater ease to apply the forceps correctly to the infant's head in the pelvic inlet. For example in a case of generally contracted and somewhat flat pelvis where the sagittal suture lay in the transverse diameter, I succeeded in applying my forceps in the left oblique diameter so that the marks round the infant's head indicated an absolutely correct hold.

By reason of its large cephalic curve my forceps seizes the infant's head during strong traction chiefly with the peripheral third of the blades, not so much with their centre. Thereby is rendered possible something which I have had opportunities of directly verifying, viz., a rotation of the head within the forceps both during traction and during the pauses.—*Both these deviations in the curve of the forceps blades from Tarnier's model facilitate therefore changes in the position of the head during its progress through the genital canal, and render a fresh application of the forceps unnecessary in the vast majority of cases.* In 25 high operations with my forceps I have found that there were reasons

for such applications only in the case where the infant's position was dorso-posterior, and the first application had to be made with the concavity of the pelvic curve towards the face of the infant. The advantage of as few forceps applications as possible in this operation is apparent to all.

I have already previously mentioned that Tarnier specially laid down the requirement that, for the infant's head to be able to go through its normal changes of position, the tractions must be carried out by means of the traction attachment even during the passage of the head through the pelvic cavity, not alone in the pelvic inlet. This condition must even nowadays be considered fully justified, as these changes of position take place while the infant's head is in the pelvic cavity. It is only the complicated construction of the older axis-traction forceps and the inconvenient method of using them which has brought it about that the classic forceps is still generally used as soon as the head has passed the pelvic inlet even if it is not yet "rotated."

By means of the simple lock system in the traction attachment in my forceps the change from the ordinary forceps to an axis-traction forceps has become so simple and easily executed that the operation becomes in no way complicated by the use of the traction attachment. As above-mentioned, my forceps has certain advantages which do not interfere with the changes of position of the head in the pelvic cavity. *I can now therefore on good reason lay down the condition that the obstetric forceps must be used armed with the traction attachment as long as the infant's head is above or in the pelvic inlet or in the pelvic cavity; only when the head rests on the pelvic floor "rotated" is the traction attachment unnecessary, and can for convenience sake be removed.*

Especially does the use of the traction apparatus appear to me important in cases of slow rotation of the infant's head. By carrying out the traction with the one hand and by lightly exercising pressure on the forceps with the other hand in the desired normal direction of rotation, the change of position can undoubtedly be brought about in a much less dangerous way than is possible by using ordinary forceps.

The advantages which my new forceps seems to promise for practical obstetrics seem to be specially great as far as Finland is concerned. Only a very small portion of pathological deliveries are treated in the maternity hospitals, the vast majority of women in child-birth remain at home. The nearest practitioner is summoned, often in quite a late stage of delivery when there is already danger for the mother and the child. The doctor has then often to choose between perforation of a living child or an attempt to deliver the woman with a "high" forceps. The relatively numerous forceps applications on a high-standing head which are

and will continue to be specially necessary in the country districts in Finland demand on the part of the practitioner great attention to that difficult and dangerous operation. Obviously in the treatment of such cases the estimation of the woman's general condition plays the chief part, but on the other hand special attention must be given to the technical difficulties in carrying out the operation. An endeavour to avoid these difficulties and render the operation itself as simple as possible has been the incentive to all the modifications I desired to have carried out in my new forceps. As it seems to me to be specially adapted to Finnish conditions, I wished, with the ready consent of my colleagues, to give it a suitable name—other children discharged from the maternity hospital also receive their names—and have called it the "forceps fennica."

For the sake of comparison I wish to give here some measurements for Tarnier's, Simpson's and Naegele's forceps and for my forceps. They show that no very considerable changes in the dimensions of the forceps were necessary in the new construction.

With the traction attachment the example of Tarnier's forceps in use in the maternity hospital at Helsingfors weighs 660 gr., with the traction attachment 950 gr. The Simpson's forceps which is in use weighs with traction attachment fastened to it 750 gr. With regard to Naegele's forceps it is said that the weight must not exceed $\frac{3}{4}$ gr. Without the traction attachment my forceps weighs 650 gr., with it 920 gr. The weight of the traction attachment, 270 gr., is therefore almost a third of the whole weight. This relatively high weight in practice does not have any ill effect, because the whole time the traction attachment is supported by the operator's hand. The most important thing is to have the weight of the handles reduced as far as possible and by making the handles, including the shoulders (which in the example weighed are solid) hollow I hope still further to be able to reduce the weight of the instrument.

Some measurements of length may here be added. The distance between the tips of the blades to the insertion point of the handle-bar of the traction attachment is in Tarnier's, Simpson's and my forceps 36 cm.

The distance from the insertion point of the traction-rods at the root of the blades to the handle-bar: in Tarnier's 24.5, in Simpson's 25.5, and in my forceps 25.0 cm.

The whole length of the instrument: in Tarnier's 38.5, in Simpson's 37.0, in my forceps 38.0, in Naegele's forceps 40–45 cm.

The distance from the points of the blades to the lock: in Tarnier's 24.5, in Simpson's 22.5, in my forceps 23.5, and in Naegele's 25–30 cm. When closed the distance between the tips of the blades is in Tarnier's 2.0, in Simpson's 2.5, in my forceps

2.5 cm., and the width of the cephalic curve is in Tarnier's 7.0, in Simpson's 8.2, and in my forceps 8.2 cm.

If the width of the cephalic curve is increased to 10 cm. by opening the forceps, the distance of the tips of the blades from each other is in Tarnier's 5.7, in Simpson's 5.0, and in my forceps ca. 5.3 cm.

The figured and first specimen of the "forceps fennica" has been made by Mr. G. Gustafsson, foreman in the workshop of Chr. Nissen, Instrument Maker at Helsingfors. For the willingness with which the works were ready to carry out the repeated alterations in the modelling of the instrument I desire to express my gratitude.

At the same time I must express my sincere thanks to Professor G. Heinricius for permission to use my instrument in practice in the maternity hospital at Helsingfors. I am also much indebted to Docent O. A. Boije for similar kindness during the time I had the advantage of being in charge of his private and general hospital and maternity institution.

The experience from the twenty-five high forceps deliveries which I had an opportunity of carrying out with this forceps has convinced me of the superiority of the "forceps fennica" over other so-called axis-traction forceps, and of its equality with the ordinary forceps in low applications.

Finally I have to express my great gratitude to Professor Otto Engström who on many previous occasions and even now has placed his large library at my disposal for studying the exhaustive literature dealing with the question of obstetric forceps.

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# Breast Feeding. Some Functional Requirements of the Gland and of the Infant.

By Harold K. Waller, M.B., B.C. (Cantab.).

The high position reached by obstetrical science has been influenced in a great measure by the urgent and dramatic nature of the difficulties and disasters of childbirth. To this no doubt is due much of the accuracy with which their causes have been elucidated and the treatment prescribed. The study of infant feeding has possibly suffered by virtue of its problems coming as a kind of anti-climax. At least it would seem that knowledge in matters pertaining to early infancy has hardly proceeded at the same rate, for tradition still influences a larger share of therapeutics here than is tolerated in obstetrics. Purgation has not yet been dethroned from its position of sinister importance; dentition is still held responsible for a multitude of ailments with which it can have but the faintest connexion; and the early failure of lactation has come to be almost tacitly accepted as an inevitable pitfall in the path of infant welfare. If it should appear paradoxical to associate tradition with this last example in face of all the modern improvements in artificial feeding, all the great chemical and industrial activity with which its elaboration has been associated, it must also be remembered that it is the lack of accurate knowledge of the subject of lactation that has given bottle feeding its chief impetus. Without this its present high standard of development could hardly have been reached. Once the negative character of this structure is appreciated there appears to be room for doubt whether the underlying physiological principles are such as they are represented to be.

Unfortunately, the chapter of physiology dealing with lactation can be searched in vain for facts which offer any help to the physician. The analysis of milk has been used almost wholly in the service of artificial feeding. Knowledge of the functional behaviour of the breast remains very much where Budin's [1] research left it, though the work of Pritchard [2] has suggested many valuable possibilities for its extension, and in *The Lancet* there appeared recently three important papers on breast feeding, written by Dr. David Forsyth,[3] Dr. Lucy Naish,[4] and Dr. Disney Cran.[5] Dr.

Forsyth's article deals with the quantities of breast milk taken by an infant at individual meals in a series of weighing experiments conducted over a period of several weeks, and he suggests that his conclusions would repay further investigation. Most people will agree with his statement that "compared with the great strides that have been taken in the last half century in artificial methods of feeding, not a great deal has been done to extend our control over nature's method." Dr. Naish, in a paper which, like the other two, deserves wide recognition, discusses many details in the management of breast feeding. Perhaps the most important point to which she directs attention is the periodic character in the secretion of milk. Dr. Cran is concerned with the view of certain French physicians. He gives prominence to Dr. Variot's criticism of Budin's teaching that many breast-fed infants suffer from superalimentation. He emphasises Variot's maxim: "Let the child on the breast drink according to its appetite."

The value of the several points brought out by these three writers is immensely enhanced if they are taken in conjunction with one another. To emphasise the need for correlation between (1) the periodicity in the secretion of milk, (2) the size of the meals, and (3) the infant's appetite, is the object of this contribution. It is hoped that some of the difficulties which surround the subject may thereby be lessened and the way cleared for further observation, which will result in lactation being removed from its present unsatisfactory position, partly within and partly without the pale of accurate medical science.

Efforts to control the flow of milk which do not take into account the periodic character of its secretion are likely for the most part to end in failure. To this fact must be attributed much of the strength of a very widespread conviction that lactation is a most unreliable function. In the course of many observations from which these notes were constructed, no fact stood out with more prominence than the completely erroneous nature of this belief. And the next conclusion to be reached was the rarity of what is commonly regarded as the typical way in which lactation is liable to fail—viz., so marked a physiological inability to supply sufficient food to satisfy the infants requirements that supplementary feeding is clearly indicated within the first few weeks after delivery. The report of this very frequent occurrence must always be received with scepticism in the case of infants born normally at or about the full term of gestation of averagely healthy women. Careful inquiry will usually elicit the presence of one or more factors at variance with the requirements of the gland or of the child, and in no sense can the failure be detected in the function of lactation itself. Reference to its reputation for inability to fulfil its task is not infrequent before the birth of the child, but examination will always

detect the preparatory changes which accompany the course of pregnancy, and which are described in all the text-books of obstetrics. They are indeed mentioned as a reliable help in cases where the diagnosis of conception is open to doubt. Equally free from variation are the events of the first few days following delivery. A sensation of fulness or discomfort, accompanied by a demonstrable enlargement and rise of temperature in the gland, is followed by a free discharge of milk on the third, fourth, or fifth day. Up to this point evidence in favour of uniformity of function is practically without exception. It is with the difficulties which supervene thereafter that we are concerned, and this fact in itself suggests that it is into the traditional methods of nurture that investigation must first be pursued.

It is not the purpose here to enter into the conditions in which the breast may be expected to share in a general lowering of bodily health. That such cases exist and are justifiably recognised as indications to wean the child, is sufficiently well known. Thus the complication of pregnancy by one of the severe toxæmias, by hæmorrhage, starvation, morbus cordis, or tuberculosis; the existence of some grave degree of post-parturient illness; these and other conditions which lower all the vital functions may reasonably be expected to lower also the secretory activity of the breasts. But such conditions, with the exception of starvation, are rare and need not concern any general investigation into the normal behaviour of the mammary glands. Nor need space be devoted to abnormalities such as depressed or inverted nipples, which will mostly yield to careful treatment applied during pregnancy; to fissures and the sepsis of which they are the precursors, for they are preventable; or to the pain of suckling, described by Dr. Naish which is apparently variable, as is the fortitude with which it is resisted by the individual. The presence of one or more of these features is an accidental circumstance in which the proper function of the breast may be obscured. But to explain the numerous failures in which none of them exist it is necessary to consider a completely separate set of factors.

The first of these factors is the failure to pay enough regard to the periodic character of the secretion. It is not always easy to demonstrate in primigravidæ until suckling has continued for some three or four weeks. In multigravidæ, on the other hand, its occurrence is often recognisable much earlier. For its establishment all that seems necessary is the regular stimulation of suckling with a sufficient interval between the infant's meals. If this be observed the woman will become aware of a sensation which is variously described as a rushing, tearing, or painful stabbing in the breasts, known as the "draught" and experienced as soon as the child's mouth is applied to the nipple. In some the breasts

can be observed to swell and become tense where a few moments earlier they were flaccid and apparently empty. There is in all probability a contractile muscular element in the occurrence, but there is also an undoubted secretory activity, for milk runs spontaneously from the nipple. In cases where the periodicity is firmly establishment the engorgement may even occur at the appointed time without the breast being stimulated by suckling; the flow lasts for a few minutes and then ceases. The experience of the "draught" early in lactation is undoubtedly helped by the strong suction of a healthy child. But it can quite well be demonstrated when the baby is weakly and premature, provided the proper requirements, to be mentioned later, are borne in mind. Its maintenance throughout the course of lactation is perhaps the surest sign that breast feeding has been normally carried out, and this is reflected in the almost invariable progress of the infants so fed. Conversely, in all cases where a child has taken the breast for a few weeks and the "draught" is only felt occasionally or not at all, suspicion should be roused that the regime is not satisfactory. Until this is regulated to meet the physiological requirements of the gland, the opinion should be withheld that successful breast feeding is not feasible.

The foregoing leads directly to a consideration of what methods are and what are not calculated to obtain the optimum secretion of milk. The problem is best approached from the maternal aspect. For if attention is focussed on the child alone there is a tendency to take for granted that a failure to gain in weight, dissatisfaction with its meals, disorders of digestion, sleeplessness, or other similar ailments are in themselves evidence that the breasts are not up to the task of providing food of suitable quantity or quality. A combination of these misdemeanours is a strong indication that the food-supply does not fulfil its requirements, and there can be no question at all that too frequent suckling is the commonest cause of its impoverishment. The custom of urging women to feed their infants at two-hourly intervals nine or ten times during the 24 hours is responsible for weaning in an enormous number of cases. The only basis that can be found for the prevalence of so unexceptionally bad a maxim is the anatomical view that the stomach of a newborn child is so small that it needs frequently refilling. Probably the customary supervision by practitioner or nurse, which seldom extends beyond a month, has been partly responsible for the failure to detect the disastrous results to which the rule leads. A month is about the limit of time for which a woman can endure the two-hourly imposition, and when about then the signs of ailing are obvious the breast milk is blamed rather than the rule which, backed by the sanction of high authority, has been responsible for the trouble. In seemingly contradictory cases

where the child is thriving, a careful inquiry will usually discover that, though the rule was carried out at first, the sheer impossibility of obedience has led to its fracture, and a far longer period has been allowed to elapse between the feeds. In the case of the obedient it will be found that the "draught" which was felt regularly during the first few weeks became less and less noticed, and the reflex overflow from one breast which normally occurs when the other is taken by the child has ceased. The infant is restless and dissatisfied, cries at the breast, and even refuses to suckle, the stools are infrequent, and the weight is stationary. In these circumstances, to increase the interval between the feeds is not so obvious a step as to supplement them, for clearly the child is hungry and the breast milk is actually poor both in quality and quantity. The comparative peace which follows the administration of a bottle convinces the parents and obscures the issue beyond elucidation or correction.

### Chart 1.

The gain in weight recorded on the first chart exemplifies a case of the sort just mentioned. Said to have weight over 8 lb. at birth, the child when first seen at the age of 14 weeks was wasted, ravenously hungry, and had by its screams driven its parents almost distracted. The mother, a frail, poorly nourished woman, 40 years of age, applied for advice in great perplexity, being quite unable to afford the expense of the artificial feeding which had been ordered. The only alteration which could be made was to substitute 7 meals for the 10 or 11 which had been given. The weight is seen to rise rapidly, and easily surpasses the curve plotted by Budin which is printed on the chart and which was considered by him to represent a normal rate of progress. After a week the number of meals was reduced to 6, and again a week later to 5. At the eighteenth week they numbered 4 in 24 hours, on which number the child throve until weaned at the tenth month. Almost as noticeable as its contentment was the gain in the woman's health, due in large measure to her improved rest by night.

### Chart 2.

The second chart shows a very usual rate of gain in weight when the plan of giving infrequent meals is started from birth. In this case 6 meals was the daily allowance until the sixth week; then 5 were given until the tenth, and after that date 4 only in 24 hours. During the third week the infant developed a severe suppurative mastitis, which had to be incised freely under anæsthesia. The mother of this child had the advantage of being able to afford better food than the one quoted in the first case. She was also younger and in better health.

The method has, at any rate, the advantage of decreasing the burden on the mother. Thus, over a period of 45 days quoted by Dr. Forsyth in his experiment, 413 feeds were taken by the child, the daily number varying from 7 to 11 and averaging 9. Over the same length of time the infant whose weight in Chart 2 is quoted above took 255 meals—a saving of 158 to the mother in little more than six weeks.

These two cases suggest that the breast tissue fulfils the physiological law that to obtain the maximum output of work a suitable stimulus must be applied at a suitable interval. The suggestion finds strong reinforcement when the amount of milk obtained at individual meals is estimated. In some hundreds of cases where test meals have been taken their size has been found to increase as the frequency of the administration has fallen. Further, it has been found over and over again that the total quantity in 24 hours is greater when the number of meals given is 6 rather than 9 or 10, and greater still when the 6 give place to 5 and 4. In so far as these experiments have gone, it would seem that this change to the smaller numbers can be made about the sixth or eighth week.

Before proceeding to discuss the results obtained by weighing infants before and after their meals, it will be convenient to consider the capacity of the infantile stomach. Whether or no the breast-milk ingested stays for long in the stomach itself, or whether the majority passes rapidly into the bowel is not easy to determine. Absorption of water, an essential factor in the rapidity of growth which takes place during the first months of life, is probably no part of the stomach's task. In the young of man, of the apes, of monkeys, and of certain other animals, the relative capacity of the stomach and intestines is well adapted to this arrangement, as is the flocculent nature of whatever curd is formed in gastric digestion. In the ruminant herbivora and carnivora the breast-milk forms a solid clot on curdling, needing prolonged gastric digestion; in the horse, the ape, and in man the curd is more flocculent and its passage into the intestine rendered easy and rapid. Chalmers Mitchell,[6] taking 100 to represent the total cubic capacity of the digestive tract, gives the following proportions for newborn in certain mammalians:—

| | Cubic capacity. | |
|---|---|---|
| | Stomach. | Intestines. |
| Ruminant herbivora ..... | 70 ..... | 30 |
| Carnivora ..... | 70 ..... | 30 |
| Herbivora ..... | 10 ..... | 90 |
| Man, apes, monkeys ..... | 20 ..... | 80 |

The work of Lewis[7] and Jefferson[8] on the musculature of the stomach suggests both the presence and activity in man of an

arrangement of fibres which exert a canalising influence on the organ. The function of this "canalis gastricus" in other animals is to conduct fluid directly from the cardiac to the pyloric orifice, and there are certain features about the way in which infants feed quite compatible with the presence of some such mechanism. The size of their meals will be referred to later. At this point it is worth recalling what happens in cases where obstruction exists in the region of the pylorus. In spasmodic closure or in hypertrophic stenosis, waves of contraction can be seen immediately fluid enters the empty stomach, and unless its passage into the duodenum is effected vomiting soon follows. It is not improbable that in normal circumstances a large part of the milk follows the same course without any appreciable delay in the stomach. These facts point to the conclusion that measurement of the cubic capacity of the stomach, by post mortem or other methods, is more likely to indicate the length of sojourn of the food therein than to provide a reliable guide to the amount which can be taken and assimilated at a single meal. It is important that this should be appreciated, for, as will be shown, if wide intervals elapse between the meals the size of the meals themselves becomes far larger than is compatible with the view usually held about the gastric capacity. A more trustworthy guide remains in the behaviour of the infant, and it is perhaps on this score that the strongest indication presents itself for adopting infrequent meals with an ample interval for digestion. A baby in whom there are no signs of digestive disturbance, who shows no objection to waiting many hours for its food, and who is gaining weight rapidly and developing strongly, fulfils the canons of good behaviour. This behaviour depends for its possibility on the maintenance of an adequate supply of milk.

The 10 or 11 meals which are still enforced in many maternity hospitals take little account of, though they are largely a contributory factor to, the high delicacy rate which is observed amongst infants whose mothers have had the benefit of delivery in these institutions. The strain on the breasts begins to have its baneful effect after about a fortnight or three weeks—that is to say, shortly after the patient's discharge from hospital. It is noticeable, too, that this corresponds to the statement often made that the milk "failed" when the woman got up and took on household duties. Indeed, it frequently happens even earlier, and the suggestion that the gland is primarily at fault is strengthened in hospital by the manufacture of bottle-feeds by the nurses, the contents of which are added to the 10 daily meals. So, too, the pathologist's report that the milk is markedly deficient in fat is again accepted as the fault of the breast and not thought to be a possible result of overtaxing its capacities. Nor can the view be accepted that the smaller the infant, as in cases of prematurity, the more frequently

must it be fed; for it presupposes more rapid powers of digestion in the weakly than in the strong. The requisite interval must be allowed, and this holds good for small twins where, in view of the double demands made on the breast, special care must be taken.

Turning to the question of the size of individual meals, detailed experiments are not easy to carry out over long periods; but permission was obtained to conduct a series of test meals in one case, and the results are here given side by side with those for the first five weeks of Dr. Forsyth's observations. It is clear that the importance of individual differences may be exaggerated in comparisons made between two cases, and from so small a number no very conclusive inferences can be drawn. But certain interesting figures are given which, even with this allowance, lend support to the arguments already outlined. The experiment in the case marked B could not be prolonged beyond five weeks. The mother and child were both averagely healthy; pregnancy, labour, and lying-in were all uneventful. Briefly summarised, there was a difference of 15 oz. in weight at birth. A was put to the breast 279 times and B 186 times in five weeks; yet B obtained 692 oz. of milk to A's 528, or 164 oz. more with a saving of 93 meals to the mother. Here a difference must be mentioned, however, for B was put to both breasts at each feed, and Dr. Forsyth states that the child in his experiment was never given more than one at each feed. The reason for this is not clear, for the "draught" occurs simultaneously in both breasts. The weekly amount is given in the following table with the daily average for each week:—

TABLE I.—*Weekly Consumption of Milk.*

| Week. | Total milk. | | Daily average. | |
|---|---|---|---|---|
| | A. | B. | A. | B. |
| 1st* ..... | 26½ oz. | 37 oz. ... | 9 oz. | 12 oz. |
| 2nd ..... | 128 oz. | 122 oz. ... | 18 oz. | 17 oz. |
| 3rd ..... | 106 oz. | 151 oz. ... | 16 oz. | 21 oz. |
| 4th ..... | 116 oz. | 182 oz. ... | 16½ oz. | 25 oz. |
| 5th ..... | 152 oz. | 201 oz. ... | 22 oz. | 28 oz. |

* Three days only.

The steady increase of 30 oz. per week in the case of B will at once arrest attention. The fact that during the second week A obtained more milk than B is noteworthy, for it shows there is no reason to claim for the latter's mother any functional superiority in the power of yielding milk. The superiority which is established during the third and fourth weeks is due in all probability to the number of meals suiting the requirements of the breast and of the infant. That this was not so in the case of A is suggested by the yield in the third and fourth weeks being below that in the second.

Taking the daily consumption of milk in the fourth week the following figures appear:—

TABLE II.—*Daily Consumption of Milk in Fourth Week.*

| Day. | Total consumption. A. | B. |
|---|---|---|
| 22nd | 13½ oz. | 26½ oz. |
| 23rd | 12½ oz. | 24½ oz. |
| 24th | 19 oz. | 24½ oz. |
| 25th | 15 oz. | 25½ oz. |
| 26th | 20 oz. | 26 oz. |
| 27th | 18½ oz. | 27½ oz. |
| 28th | 17 oz. | 27½ oz. |

The closer resemblance in the size of B's meals points to the uniformity of secretion and probably of the infantile appetite.

It is clear that by this time the smaller child (B) is taking larger quantities, though having fewer meals than the bigger child. The next table, showing the average size of individual feeds, is also in favour of B.

TABLE III.—*Average Size of Feed.*

| Week. | A. | B. |
|---|---|---|
| 1st | 1 oz. | 2 oz. |
| 2nd | 2 oz. | 3 oz. |
| 3rd | 1¾ oz. | 3½ oz. |
| 4th | 1¾ oz. | 4¼ oz. |
| 5th | 2¼ oz. | 4¾ oz. |

The largest and smallest feeds are next compared:—

TABLE IV.—*Largest and Smallest Feeds.*

| Week. | Largest feed. A. | B. | Smallest feed. A. | B. |
|---|---|---|---|---|
| 1st | 2 oz. | 3¾ oz. | ¼ oz. | 1 oz. |
| 2nd | 4½ oz. | 3¾ oz. | ¼ oz. | 2¼ oz. |
| 3rd | 4½ oz. | 5 oz. | ¼ oz. | 2½ oz. |
| 4th | 3½ oz. | 7 oz. | ½ oz. | 3 oz. |
| 5th | 3½ oz. | 6 oz. | 1 oz. | 4 oz. |

The contrast in the results of the two methods is perhaps best brought out by a table which shows the total amount of milk taken each week and the number of meals given to each child:—

TABLE V.—*Weekly Consumption and Number of Meals.*

| Week. | A. Number of meals.* | Amount taken. | B. Number of meals. | Amount taken. |
|---|---|---|---|---|
| 1st | 27 | 26½ oz. | 18 | 37 oz. |
| 2nd | 63 | 128 oz. | 42 | 122 oz. |
| 3rd | 63 | 106 oz. | 42 | 151 oz. |
| 4th | 63 | 116 oz. | 42 | 181 oz. |
| 5th | 63 | 152 oz. | 42 | 201 oz. |

* The number is based on an average of nine per diem.

From this it can be calculated that A takes 528 oz. in 279 meals an average of just under 2 oz. per meal, while B takes 692 oz. in 186 meals, or an average of just under $3\frac{3}{4}$ oz. per meal.

Thus it appears that the daily and weekly consumption and the average size of the feeds are in B's favour. To this must be added the fact that A weighed 8 lb. 2 oz. at birth and gained 2 lb. 4 oz. in 44 days. B weighed 7 lb. 3 oz. at birth and gained 2 lb. 1 oz. in 35 days.

To those who have not employed the weighing machine in this kind of work, it may come as a surprise that a child can take 7 oz. of food from the breasts at one meal as early as the twenty-first day. Many other examples could be given showing that this is not an abnormally high record. As an instance of what occurs later, the case whose weight has been given in Chart 2 may be quoted. From time to time the child was weighed before and after each meal given over a period of 24 hours. At the twelfth week 33 oz. were taken, at the eighteenth 41 oz., and at the twenty-third 48 oz. The figures for the individual meals making up the last total are interesting, but not exceptional. The woman was a primigravida.

TABLE VI.—*Amount taken in 24 Hours at Twenty-third Week.*

| Time. | Amount. | Time. | Amount. |
|---|---|---|---|
| 6 a.m. ..... | 14 oz. | 6 p.m. ..... | 11 oz. |
| 10 a.m. ..... | 12 oz. | | |
| 2 p.m. ..... | 11 oz. | Total..... | 48 oz. |

If appetite be considered as an expression of digestion the figures given suggest that large infrequent meals do not disagree with quite young infants. A long sleep at nights is of the greatest value to the mother, particularly if lactation is to be prolonged for eight or ten months. There is no better way to obtain it than by this method. The infant just mentioned would sometimes sleep 14 hours at a stretch if not disturbed. In all cases care must be taken to remove two common barriers to the success of this or any other plan for feeding infants—tight and superfluous clothes and insufficient ventilation. With these precautions, and with the mind relieved of the need for slavish obedience to conform to a custom which has no scientific basis either on the maternal or the infantile side, it is quite easy for any woman to find out how often her child requires feeding. If allowed to be comfortable in other ways the child will give unmistakable signs of hunger when digestion and assimilation have proceeded to the right point. The cry of the overfed—*i.e.*, of the too frequently fed—is commonly mistaken for the cry of hunger. When an infant shows the soundness of its instinct by refusing a sequence of rapidly proffered invitations to

feed, it is thought at once, perhaps by analogy with adult behaviour, to be ailing; and this despite every other appearance of health. Or when, with misplaced confidence in the knowledge of its elders, it accepts and pays the penalty in pain, vomiting, and colic, the resultant screams only lead to further misunderstanding to which the bottle is the usual solution offered.

To quote Dr. Forsyth again: "With no means of increasing or modifying the natural supply, bottle-feeding is the first and only resource when an infant fails to thrive on breast milk." In the case of those who can afford to pay a nurse to devote her entire time to the preparation of the infant's food and attend to its needs in other directions the change can be effected with the minimum of danger. Even so the health and physique of an artificilly reared child are seldom comparable to those of one satisfactorily reared on the breast. The fact that so many hold this statement to be unproven is an indication of how rarely successful breast feeding comes under the notice of the medical profession.

Artificial feeding in its present stage of development is a science needing a considerable knowledge of bacteriology and physiological chemistry. In the light of present events the annual statistics of infant mortality published by the Registrar-General and the tremendously delicacy rate amongst survivors which they imply can hardly be dismissed with complacency. Nor can the problems of lactation be allowed to remain where they are left by the above quotation. A return of the summer heat of 1911 will witness just such another holocaust of young lives as occurred in that year. And this not necessarily because of any hereditary weakness, but chiefly, almost solely, on account of the inapplicability of artificial feeding to the masses. The institution of normal, uninterrupted, and successful breast feeding until an age at which milk no longer forms the chief constituent of the infant's diet has assumed an aspect of importance worthy to rank beside any of the great issues with which the country is faced.

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3. David Forsyth. "Breast Feeding—the Consumption of Breast Milk." *The Lancet*, June 14th, 1913, p. 1656.

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6. P. Chalmers Mitchell. "The Childhood of Animals."

7. Frederick T. Lewis. "The Form of the Human Stomach." *American Journal of Anatomy*, vol. xiii.

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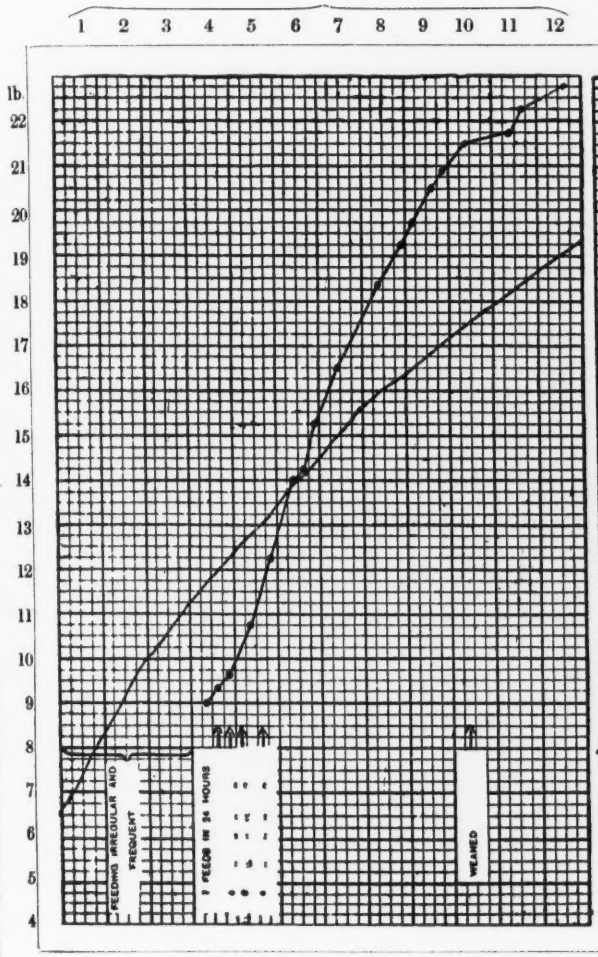
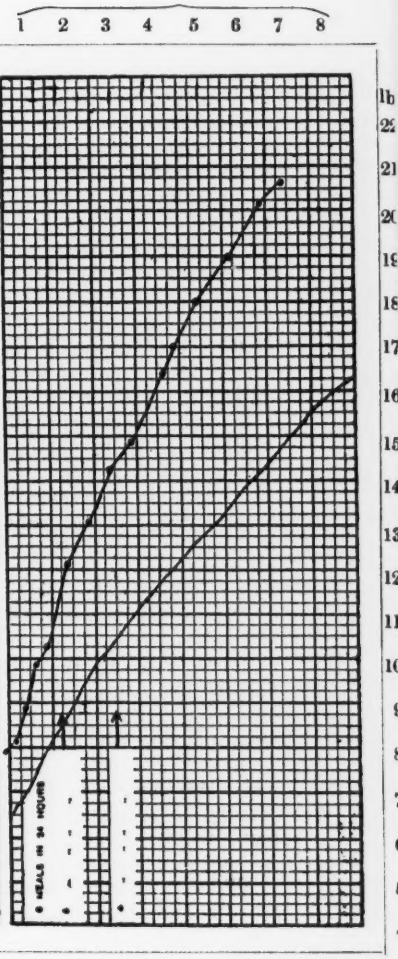
CHART 1.


Months.
1 2 3 4 5 6 7 8 9 10 11 12
lb.
22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4
FEEDING IRREGULAR AND FREQUENT
7 FEEDS IN 24 HOURS
WEANED

Record of weight gained by breast-fed infant on adoption of less frequent meals. Continuous line is Budin's curve.

CHART 2.




Record of weight gained by breast-fed infant. Infrequent meals from birth.

# REVIEWS OF CURRENT LITERATURE.

UNDER CHARGE OF EARDLEY HOLLAND, M.D.

## American Journal of Obstetrics.

July, 1914.

1. Retrodisplacements of the uterus following confinement. By AUSTIN FLINT, jr., M.D.
2. Complete sterilization of the skin by iodine. By J. WESLEY BOVEE, M.D.
3. A preliminary report of an operation for general enteroptosis. By Hiram N. Vineberg, M.D.
4. *Rupture of the uterus during labour. Report of a spontaneous case. By J. W. Long, M.D.
5. *Fatty concretions in ovarian dermoids. By J. W. MCMEANS, M.D.

**Rupture of the uterus during labour. Report of a spontaneous case.** This article first describes the case and follows with a very complete review of the whole subject, paying special attention to ætiology and treatment. The rupture reported took place in a primigravida of 32, and occurred during the progress of a normal labour. Beyond complaining of undue pain and exhibiting slightly hurried breathing, the patient showed no marked sign of the rupture having occurred. The placenta was expelled before the baby, which was delivered by internal version per vaginam. The diagnosis of rupture being confirmed by examination, operation was decided upon and the patient removed to hospital, where a supra-vaginal hysterectomy was performed. The rent was a longitudinal one, passing up to the site of a very prominent Bandl's ring. The recovery, apart from very considerable anæmia, was uneventful.

The author does not approve of the usual classification into complete and incomplete ruptures, and points out that many begin in the peritoneal coat. In reviewing the ætiology of the condition Dr. Long quotes widely from the literature, laying stress particularly upon the Cæsarean section scar as a predisposing cause of uterine rupture and upon manual interference during labour.

Considering the treatment, he is in favour of delivery per vias naturalis where this can be easily done, but in most cases favours the immediate opening of the abdomen, with delivery of the child and treatment of the rent. In this connection he considers that most cases must be classed as infected to a greater or less degree, and that they must be treated as the condition and history of each case suggests. The net result appears to be that Dr. Long favours supra-vaginal hysterectomy.

**Fatty concretions in ovarian dermoids.** Dr. J. W. McMeans reports the pathological findings in a case of a dermoid of the ovary with a twisted pedicle. The surface of the cyst was smooth, but on palpation revealed many areas of irregular thickening. There were dark areas of congestion over the surface, and through its wall many spherical bodies could be felt. These were found to be innumerable putty-like concretions varying in size from a pea to a marble, and some large masses incorporated in which were many dark-brown hairs. The balls contained an irregular central cleft in which was seen a clear, brown, oily fluid.

Microscopically the connections had no definite structure and no enveloping membrane. The whole mass consisted of a granular amorphous material in which the " ghosts " of cells could be seen along with irregular, short, thread-like structures looking like fine hairs. It stained uniformly with hæmatoxylin except for a few small round hyaline-like bodies which stained with eosin.

A comparative examination of the concretions and of the lipoid material in ordinary dermoids showed that the fat drops were larger and there was much more cell debris in the former, while it also contained inflammatory cells.

August, 1914.

1. *Polypoid chondrofibroma of the Fallopian tube associated with tubal pregnancy. By GEO. W. OUTERBRIDGE, M.D.
2. Cæsarean section necessitated by pelvic chondrosarcoma. By D. NATHAN, M.D.
3. The pathogenesis and differential diagnosis of peri-renal abscess complicating the postpartum period. By CHARLES GREENE CUMSTON, M.D.
4. Plea for a more uniform use of the Murphy button. By J. W. KENNEDY, M.D.
5. The application of the ninhydrin reaction to the urines and urine dialysates of pregnant women. By LOUIS BERMAN.

**Polypoid chondrofibroma of the Fallopian tube, associated with tubal pregnancy.** This is the report on a specimen removed during an operation for early tubal pregnancy. A small papillary growth was found practically filling the lumen just proximal to the placental area. Microscopic examination showed it to be a somewhat degenerate fibroma, covered with tubal epithelium and containing several hæmorrhagic areas and an island of hyaline cartilage. No pedicle could be found connecting the tumour to the tube wall. It is considered possible that the little growth, almost blocking the tube lumen near the uterine end, may have been a factor in the arrest of the ovum and the consequent development of the tubal pregnancy.

September, 1914.

1. *Experimental ligation of one ureter, with application of results to clinical gynecology. By WALTER CLINTON JONES, A.M., M.D.
2. Pseudostruma of the ovary. By LAWRENCE W. STRONG, M.D.
3. Report on a case of rupture of corpus luteum with intra-peritoneal hæmorrhage. By MILTON R. BOOKMAN, M.D.
4. Abdominal wall hernia. Observations in the principles and behaviour. By A. BELCHAM KEYES, M.D.
5. The mortality in Cesarian section. By GEORGE M. BOYD, M.D.

**Experimental ligation of one ureter, with application of the results to clinical gynecology.** Dr. Clinton Jones presents a paper of great interest, and holds that his experiments favour the view that intentional ligation has a definite place in the treatment of ureteral injuries. He divides his paper into three parts, the first dealing with the literature and technique of experimental ligation, the second with his own experiments, and the third with the application of the results to gynæcological surgery.

His experiments show that moderate hydronephrosis is the first result of occlusion, while later some kidneys continue to enlarge and others begin to atrophy. There is nearly constant evidence of some intrarenal infection, and the younger the animal employed the more marked the infection. Adhesions were much more marked in the atrophic than the

hydronephrotic kidneys. It was also found that the lower the ligature the more was the likelihood of atrophy.

Though no measurement of intraureteral pressure was taken, the observation was made that most of the cystoses were more or less flaccid, and only rarely was there much tension, this condition obtaining either within a few days of ligature or in the presence of considerable infection.

Regarding the practical application of these experiments, the author considers that intentional ligation of the ureter may be indicated in cases of injury, etc., in order to put a stop to the functions of the affected kidney. It may be necessary, too, when the patient's condition will not allow of the repair of an injury. Here it may be used as a temporary measure.

## Surgery, Gynæcology and Obstetrics.

xix, September 3, 1914.

1. *The origin and nature of fœtal movements. By Evarts A. Graham.
2. *Mastitis lactantia; etiology, behaviour, treatment, and sequelæ. By A. Belcham Keyes.
3. *Concerning the formation of a new vagina in the case of congenital vaginal malformation. By Gotthard Schubert.
4. *Observations on the gonococcus complement fixation test employing specific and non-specific antigens. By B. A. Thomas, Robert Ivy, and J. C. Birdsall.
5. *Notes on vesico-uterine transposition. By Thomas J. Watkins.
6. *The surgical treatment of complete prolapse of the uterus. By Emil Novak.

**The origin and nature of fœtal movements.** In order to study this question the author has carried out a number of experiments on pregnant animals with the object of producing partial fœtal asphyxia by ligature of the uterine arteries, occlusion of the maternal trachea, and by the inhalation of $CO_2$ by the mother. The results of these experiments have led him to suggest that all fœtal movements, except sucking and swallowing, are dependent upon some degree of fœtal asphyxia.

**Mastitis Lactantia.** This article is a useful resumé of our knowledge of mammary infections, and, while perhaps useful for teaching purposes, it is not suitable for abstraction in this Journal.

**Concerning the formation of a new vagina in the case of congenital vaginal malformation.** The writer describes a method which he has devised of forming a new vagina from a portion of the rectum. Those who wish to perform the operation must study the original article, but the outlines of the method may be briefly described as follows:—The mucous membrane is freed around the orifice of the occluded vagina, and the rectum dissected free from the skin and sphincter ani. The next step is to remove the coccyx through a sacral incision, and to free the pelvic colon through this opening in order that it may be pulled out of the wound. The bowel is then divided about four inches from its lower end and the orifice of the lower, or distal, segment is occluded by sutures. A passage is then made by blunt dissection from the sacral wound to the orifice of the vagina, and the isolated lower end of the rectum is pulled through and sutured to the vaginal orifice. This portion of the gut forms the new vagina. The proximal end of the divided colon is then brought down to the anus and sutured there.

The author has performed this operation on four patients, and he knows

of five other cases which have been operated on by other surgeons; in all nine cases excellent results have been obtained. Schubert considers that his technique is superior to that of Baldwin, who makes use of a portion of the small intestine for the new vagina.

**Observations on the gonococcus complement fixation test employing specific and non-specific antigens.** The authors claim that while a negative reaction may be erroneous, a positive is more specific than the Wassermann. From 33 per cent. to 75 per cent, of patients with posterior urethritis demonstrate a positive reaction; 66 per cent. of all stricture cases were positive; and approximately 100 per cent. of cases of acute epididymitis or arthritis at least by the fifth week have given a positive gonococcus complement fixation test.

**Notes on vesico-uterine transposition.** After giving an account of the usual technique of this operation, the author states that transposition should be done before much protrusion through the vaginal orifice has taken place. He finds that the operation cures cystocele but that an occasional recurrence of uterine prolapse takes place.

**The surgical treatment of complete prolapse of the uterus.** The author advocates the Watkins-Schauta operation as the one offering the greatest probability of permanent cure in all cases of complete prolapse of the uterus. It is essential that a perinæorrhaphy should be performed at the same time.

W. W. KING.

xix, October 4, 1914.

1. *The treatment of inoperable carcinoma of the uterus by the application of heat. By J. F. PERCY.
2. *Inversion of the uterus. By MICHAEL BUCK.
3. *Spinal anæsthesia in gynæcology. By GEORGE GELLHORN.
4. *Can surgery be eliminated in the treatment of fibroid tumours of the uterus? By JOHN MCGLINN.
5. *A study of the end results in interposition of the uterus. By JOHN POLAK.
6. *The results of radical operative treatment of cancer of the uterus. By THOMAS WILSON.

**The treatment of inoperable carcinoma of the uterus by the application of heat.** In this article we have yet another method advocated for the treatment of advanced carcinoma of the uterus. The author claims that the application of heat by means of a special thermo-cautery at 50 to 55 degrees Centigrade will destroy cancer, leaving healthy cells unharmed. He makes the startling statement that this method will "give approximately 50 per cent. remaining free from recurrence over five years," provided that "the cases are not practically hopeless when they first present themselves for treatment." The author promises his actual statistics in a future paper.

**Inversion of the uterus.** Buck has had the good fortune to meet with two cases of inversion of the uterus at six and nine months respectively after the accident had taken place. He has devised an operation for the cure of these cases which has been so successful that each of the patients have had subsequent normal pregnancies since the operation. The method of procedure adopted by the writer was to incise the anterior wall of the inverted vagina from cervix to fundus. The uterus was then re-inverted through the incision and sutured with catgut. Some points in the technique are a

little difficult to follow, and the diagrams, which show the sutures in the posterior wall, do not help to elucidate matters.

**Spinal anæsthesia in gynæcology.** Spinal anæsthesia finds a very whole-hearted advocate in Gellhorn, who reports a list of 169 abdominal and vaginal operations performed under the influence of novocaine. The article states that there is less risk and fewer post-operative complications when spinal anæsthesia has been used, and the mental strain to the patient, which the author regards as a possible objection, is removed by a course of bromides, a dose of veronal the evening before the operation, and finally an injection of morphine on the morning itself.

**Can surgery be eliminated in fibroid tumours of the uterus?** The material for this paper was obtained by the common American method of posting a series of questions to gynæcologists and members of the American Rontgen Ray Society. The elucidation of somewhat complex problems by means of set questions is generally unsatisfactory, because many correspondents either cannot, or will not, commit themselves to an unqualified answer. In the present instance replies were received to about half the letters sent, and one-third of the correspondents, on account of lack of experience, expressed no opinion. The outcome of the enquiry appears to be that x-ray treatment gives excellent results in simple uncomplicated tumours in women at or after the menopause. Surgery, giving the same results with a slightly increased risk to life, has the advantage that it can preserve in some cases the functions of the uterus and ovaries in younger women. There was a considerable diversity of opinion amongst the radiographers as to the contra-indications for x-ray treatment. Some did not admit that any cases were unsuitable, while others thought that pelvic inflammation, degeneration, infection or malignancy in the tumour would contra-indicate radiation as it would tend to increase the degenerative changes. It was the unanimous opinion of the surgeons that these complications could not be recognised in a number of instances before opening the abdomen. The situation as between surgeons and radiographers seems to be at an *impasse* in that the latter put limitations to their treatment which the former can only diagnose by operation. It is not denied, however, that radiation is useful when operation is either inadvisable or refused.

**The end results in interposition of the uterus.** A study of the results of this operation had led the author to limit it to women with relatively small uteri who are at or past the menopause. He does not consider that cases of prolapse in which the sliding takes place in the post-pubic cleavage plane are curable by this procedure.

The morbidity following the operation is wholly due to technical defects, *i.e.*, improper preparation, imperfect hæmostasis, vesical injury, etc. He calls particular attention to the fact that the uterus should be placed behind the pubes, and not under the arch. The uterus should be curetted as a preliminary to interposition.

**The results of radical operative treatment in cancer of the uterus.** This article is statistical in character, but Wilson pleads especially for proper standards of comparison as to the end results. He points out the fallacy of including cancer of the *body* and of the *cervix* in the same set of statistics. Another important point is that in estimating the risk of any new operation account must be taken not only of the inherent danger of the operation itself, but also of the inexperience of the operator. The writer therefore suggests that

the results both immediate and remote of the first twelve operations by any particular surgeon should be excluded from statistics.

Wilson's actual results for "absolute curability"—*i.e.*, the percentage of patients seen suffering from carcinoma who remain well for five years after operation—for carcinoma of the body 24 per cent., and for carcinoma of the cervix (*a*) by vaginal hysterectomy 5.5 per cent. and (*b*) by abdominal hysterectomy (chiefly Wertheim's, but not all) 10.2 per cent. The immediate mortality of the extended abdominal hysterectomy for cancer of the cervix has fallen in the writer's own cases in the past six years to 10 per cent., while the operable ratio has doubled. He hopes, therefore, that with new methods we may before long achieve an absolute curability of 25.0 per cent.

W. W. KING.

xix, November 5, 1914.

1. Forward fixation of the cervix as a predisposing cause of some retrodeviations of the uterus, and an operation for its release. By EDWARD REYONALDS.
2. *The clinical manifestations of disease of the glands of internal secretion in gynæcological and obstetrical patients. By ROBERT T. FRANK.
3. Causal factors in the disposition to cancer in old age. By A. THEILHABER.
4. *An unusual laceration of the female urethra. By SIGFRIED FIGUEROA.

**The clinical manifestations of disease of the glands of internal secretion in gynæcological and obstetrical patients.** This somewhat lengthy article is a summary of the extent of our knowledge of the glands of internal secretion, and to be appreciated it must be read in the original.

All the elements of the glands of internal secretion act in conjunction with one another, but each, regarded individually, exerts a predominant influence upon one or more of the functions. The ovary through which all impulses to the genital tract are transmitted or in which they originate, is a compound organ made up of at least two (*i.e.*, the follicular apparatus and the corpus luteum) and possibly three (*i.e.*, the interstitial gland) components. Of these elements the follicular system—and perhaps the interstitial gland—controls the growth and nutrition of the genitals; the corpus luteum controls the periodicity and the production of the cyclical changes. The corpus luteum of pregnancy depends upon the products of conception, but the author does not appear to attach much importance to its function in regard to the embedding of the ovum.

The author finds organotherapy unsatisfactory and x-ray treatment valuable in default of better. Local treatment is almost useless and general hygienic measures still our mainstay.

**An unusual laceration of the female urethra.** The patient was admitted to hospital suffering from incontinence of urine dating from an abortion twelve years before, when she was attended by a midwife who "extracted the fœtus manually." The patient was found to have a longitudinal laceration of the urethra dividing it into anterior and posterior segments. The laceration was sutured. The author believes that the laceration was brought about by the midwife catching her finger in a somewhat dilated urethral canal during her examination.

W. W. KING.

Vol. xx, No. 1, January, 1915.

1. *Transplantation of the ovaries. By THEODORE TUFFIER.
2. Intra-abdominal dynamics and mechanical principles involved in the cause of backward and downward displacements of the uterus. By GEORGE NOBLE.

3. Bilateral congenital caput obstum. By ARTHUR MORSE.
4. Pituitary extract in marginal placenta prævia. By JOHN GARDINER.

**Transplantation of the ovaries.** Tuffier has been quite unsuccessful in transplanting ovaries from one patient to another, but he thinks that if we could prevent by some chemical substance the macrocytes from attacking the engrafted ovary it would be possible to obtain success. Better results have been obtained with autografting, but the author has not been successful in relieving the symptoms of the artificial climacteric in cases in which he has removed the uterus. When, however, the ovaries are grafted and the uterus left in position excellent results have been obtained. In twenty-eight cases both ovaries were transplanted, and nineteen of these have had regular menstruation. Autografts of one ovary alone have been done in thirty-seven cases, and of these thirteen have had regular menstruation. The author does not think that these results can be accounted for on the supposition that a portion of the ovary has been left in the abdomen, because when menstruation is dependent upon a part of the ovary in the abdomen it appears two months after the operation, and he has never seen such a quick result from a graft. He states that if one ovary is transplanted and the other left in position the transplanted one does not enlarge just before menstruation, hence he argues that if a part of the ovary has been left in the abdomen the grafts would not have become engorged in the permenstrual stage. He does not prove that they did become engorged in the cases he cites, and somehow the arguments do not carry conviction to the reader.

W. W. KING.

Vol. xx, No. 2, February, 1915.

1. *The treatment of the second degree of pelvic contraction. By HENRY JELLETT.
2. *The temperature range after supravaginal hysterectomy for myofibromata. By I. S. STONE.
3. Urinary incontinence in women.

**The treatment of the second degree of pelvic contraction.** The author considers four possible lines of treatment in pelvic contraction of the second degree (true conjugate $3\frac{3}{4}$ to $3\frac{1}{4}$), namely, induction of labour, Cæsarean section, pubiotomy, and craniotomy. This last operation is only permissible in very exceptional circumstances when the child is alive, and is the operation of choice with a dead one. The relative advantages and disadvantages of the other three lines of treatment are discussed shortly. The induction of labour in this class of pelvic contraction is not the treatment of choice, although it may be the treatment of necessity. The author sees two serious objections to Cæsarean section, first, the operation must be performed early in the first stage, and consequently it is not possible to give the patient an opportunity of delivering herself. The second objection is the result of the first, namely, that once a Cæsarean section has been done there is no logical reason why it should not have to be performed in every subsequent pregnancy. The author advocates pubiotomy as the operation of choice on the grounds that its performance can be postponed till the last possible moment when every opportunity of delivery by the natural forces or by forceps has been given; this operation improves the prognosis in subsequent labours because it causes a permanent increase in the size of the pelvis. The various dangers of the operation are considered, and a table of nineteen cases operated on at the Rotunda Hospital, Dublin, are given. Jellett considers that pubiotomy is especially indicated in young multipara because

laceration of the vagina will be less liable to occur, and the pelvis is permanently widened; conversely Cæsarean section is the more suitable operation in elderly primiparæ.

**The temperature range after supravaginal hysterectomy for myofibromata.** Almost all the morbidity after hysterectomy is a result of infection round the cervical stump. Hæmatomata are liable to form under the peritoneal flaps, and these are liable to suppurate. The author has found that iodine is a useful antiseptic to use in these cases. The appendages, if left behind, are liable to become swollen from interference with their blood supply, but, in time, they return to their normal size. W. W. KING.

Vol. xx, No. 3, March, 1915.

1. *Uterine prolapse with associated pelvic relaxation. By C. H. MAYO.
2. *Unusual cases illustrating points in diagnosis and treatment. By THOMAS CULLEN.
3. *The radium treatment of fibroid tumours. By HOWARD KELLY.
4. *Experiments in the production of abortion and labour by the use of placental extracts. By ARTHUR CURTIS.
5. Contribution to the cure of cancer of the uterus by curetting for diagnosis. By H. J. BOLDT.
6. *Ovarian tumours in pregnancy; with report of a case with a solid tumour. By W. C. DANFORTH.
7. Complete removal of adenocarcinoma of the uterus by exploratory curettage; with report of three cases. By LOUIS LADINSKI.
8. Some rare fœtal teratisms with illustrative cases—sympodia, craniophagus, and acephalus. By W. A. NEWMAN DORLAND.
9. The latest word on the subject of scopolamine seminarcosis. By C. CLARK MOSHER.
10. Extraperitoneal Cæsarean section; with a report of two cases. By J. STUART LAWRANCE.
11. *The primary results of radium treatment in uterine and rectal cancer; with a report of twenty-three cases. By HENRY SCHMITZ.

**Uterine prolapse with associated pelvic relaxation.** The interposition operation is very efficient for the relief of partial uterine prolapse associated with extensive cystocele, but it should only be used in the first and second degree of uterine prolapse. If this operation is applied to women in the fifties with soft degenerating uteri undergoing rapid atrophy, and in whom the relaxed ligaments permit the anteverted fundus to be brought outside the body, it will undoubtedly fail.

In the class of patients between fifty and sixty who have had a hysterectomy performed, and the vagina subsequently prolapses, the best results will be obtained by total extirpation of the whole vaginal mucous membrane with a complete closure of the vaginal outlet by an expensive perinæorrhaphy.

If the primary defect is uterine prolapse without much cystocele a ventrofixation may be performed by bisecting the uterine wall down to the level of the internal os. After the removal of the whole of the endometrium each lateral half is sutured between the fascia and the rectus muscle. This operation modifies Murphy's technique by suturing the uterine wall under instead of on top of the rectus fascia.

For the large class of cases of the third and fourth degree of prolapse in patients between 45 and 65 years of age, in whom interposition and

ventrofixation are contra-indicated, the author had practised the following method, which he finds very effectual : The essential points in the technique, which is given in detail with excellent illustrations, are that a vaginal hysterectomy is performed and the broad ligaments clamped on each side. The lateral clamps are approximated and a running mattress suture of chromic catgut passed backwards and forwards in such a manner as to tighten the broad ligaments. When the suturing reaches the round ligament it is caught into the angle of dissection where the bladder has been separated from the anterior vaginal wall. This suture then extends backwards, catching into the broad ligaments on each side so as to compel the bladder to rest on the broad ligaments. The vaginal mucous membrane is sutured in the ordinary way and a perinæorrhaphy is performed.

**Unusual cases illustrating points in diagnosis and treatment.** The cases described are :—

(1) A calcified lymph gland producing symptoms somewhat suggestive of gall-stones.

(2) An old and infected abdominal pregnancy with extension of the long bones into the bladder and into the bowel.

(3) A further case of adenomyoma of the rectovaginal septum.

(4) Operation for the radical cure of an umbilical hernia in a patient weighing 464 pounds.

(5) Removal of a large tuberculous cyst of the mesentery of the jejunum, together with the corresponding segment of the bowel.

**The radium treatment of fibroid tumours.** Howard Kelly reports thirty-six cases of fibroid tumours treated by radium. He has excluded from this plan of treatment only cases which have presented some serious complication, such as pelvic inflammation, ovarian growths, etc. The patients have varied in age from thirty to sixty-seven years. The indication for the operation was hæmorrhage in the majority of cases, but occasionally there was complaint of dysmenorrhœa, or pain, or a growing tumour. Tumours of all kinds have been treated—submucous, subperitoneal, and even pedunculated myomata—and they seem to respond as well as the interstitial. The results in every case except one have been either shrinkage of the tumour, or its complete disappearance. One of the most striking effects is upon the menstrual function where the radium can in all cases be depended upon to produce a complete amenorrhœa. If care is taken to avoid giving too long a treatment it is possible in some cases, especially in young women, to avoid amenorrhœa. With this object in view a large dose is given over a short period of time. The author suggests that the ideal dose of radium is 0.5 gram of radium element for two hours. If radium is tried and fails there is no evidence that the treatment will make a subsequent operation more difficult as is the case with cancer of the cervix. The radium must be placed in the uterine cavity so that it is necessary to dilate the cervix. The best answer to the question regarding the liability of overlooking malignancy in some of these radium treated fibroids is taken from Krönig and Gauss's statistics of several hundred cases of fibroid tumours treated with x-rays where not one developed malignant disease subsequently.

**Experiments in the production of abortion and labour by the use of placental extracts.** From his experiments on guinea pigs and rabbits the author finds that extract of human placenta is oxytocic. Defibrinated blood from pregnant and puerperal women possesses similar properties in a lesser degree. Defibrinated blood from non-pregnant women and normal salt solution does

not disturb pregnancy. Extract of guinea pig placenta in normal saline seems to be slightly oxytocic for pregnant guinea pigs. No noteworthy influence was exerted by the blood from pregnant and puerperal guinea pigs.

**Ovarian tumours in pregnancy.** The author reports a case of solid fibroma of the ovary complicating pregnancy. From a study of the literature he finds that ovarian tumours and pregnancy are not very common, but that enough cases are on record to make it essential that they should be systematically looked for. Operation should be performed as early as possible, and causes only a slightly greater danger of abortion than if the tumour is not removed. An extensive bibliography is appended to the article.

**The primary results of radium treatment in uterine and rectal cancers.** This article is a report of twenty-three cases of inoperable cancer treated by radium, and shows that hæmorrhage, pain and discharge are much relieved for a time after radiation. This improvement is, however, only of short duration, and additional applications have little or no effect. Early and localised recurrent growths react well to radium, but if far advanced they are very refractory. W. W. KING.

Vol. xx, No. 4, April, 1915.

1. A case of chorio-epithelioma malignum complicating a two-month pregnancy and a degenerated uterine fibroma. By J. WESLEY BOVEE.
2. *An unusual hæmatoma following labour. By CARL WAHRER.
3. *The kinetic theory of peritonitis. By GEO. W. CRILE.
4. Sarcoma of both ovaries in a child of three years. By F. H. SMITH and J. COLMAN MOTLEY.
5. *X-ray diagnosis in gynæcology with the aid of intra-uterine collargol injections. By I. C. RUBIN.
6. Surgical experiences in puerperal sepsis. By ARNOLD SCHWYZER.
7. Plaiting the round ligaments. By SIDNEY FREEMAN WILCOX.
8. *A simple method of establishing vaginal drainage. By J. C. WOOD.

**An unusual hæmatoma following labour.** Wahrer reports the following case. The patient, aged 22 years, was naturally delivered of her second child weighing nine pounds. After waiting for several hours the attending physician passed his hand into the uterus and removed the placenta. There was no unusual bleeding at the time. On the eighth day following delivery there was a slight chill with a rise of temperature to 101°, and a few days later a large mass was felt by the abdomen. When seen on the seventeenth day of the puerperium by the reporter this mass was found to occupy the entire right side of the abdomen, rising from the pelvis, disappearing under the ribs, and extending to the left across the middle line. The patient was extremely blanched with a pulse of 170 and temperature of 104°.

The abdomen was opened, and the mass proved to be a large retro-peritoneal hæmatoma. Some blood clot was evacuated, but as the patient's condition became alarming a drainage tube was hastily inserted and the abdomen closed. The patient recovered.

The exact origin of the bleeding was never determined; it may have been due to the incomplete rupture of the uterus or to capillary bleeding, as described by Williams and others.

**The kinetic theory of peritonitis.** A study of the clinical phenomena of peritonitis has led Crile to believe that they are the expression of an attempt by the body to defend itself against the invading toxins. The problem which confronted him was therefore to devise means to assist nature's defence and at the same time conserve the body energy as far as possible.

In experimental research the author has found that infections produce the identical histological changes in the liver, brain and suprarenals which are characteristic of exhaustion from any cause. These changes vary, according to the degree of exhaustion, from slight hyperchromatosis through chromolysis to a final stage of disintegration. Efficient doses of morphia will prevent these degenerative changes from taking place. Now since the conversion of energy is excessive, and the intake of food fails, and the body is depleted of water, the treatment of peritonitis resolves itself into the administration of morphia and continuous rectal proctolysis—after the necessary surgical treatment has been adopted under anoci-association. The author states that ether should never be used as an anæsthetic, since by dissolving the lecethin in the phagocytes it weakens the body's defence for from twenty to twenty-four hours—a break in the defence which may cost the patient his life. The morphia should be given belore, during and after the operation. The drug not only protects the organs, bnt it immobilises the patient, inhibits intestinal movements, prevents pain, and holds metabolism at a standstill. But little food is required, the brain suprarenals and liver are protected while the phagocytes overcome the infection.

This method has been employed in 391 cases of acute appendicitis with but two deaths.

**X-ray diagnosis in gynæcology with the aid of intra-uterine collargol injections.** By means of intra-uterine injections of 10 per cent. collargol the author has been able to demonstrate the patency or otherwise of the Fallopian tubes; he thinks that the method would be useful in the differentiation of some cases of sterility, and in the diagnosis of obscure pelvic swellings. The escape of the collargol through the tubes did not cause any peritonitic irritation, and there seems to be no danger attached to the proceeding.

**A simple method of establishing vaginal drainage.** In laparotomies in which it is probable that vaginal drainage will be necessary the author inserts a fine catgut suture into the posterior vaginal fornix. This suture is tied into the eye of a sharp-pointed pair of long forceps in such a way as to keep the point in contact with the vaginal wall. If it is found advisable to open the posterior cul-de-sac an attendant is instructed to push up the handle of the forceps until the point passes into the peritoneal cavity. A strip of gauze can then be inserted into the open jaws and pulled through into the vagina. W. W. KING.

## Archives Mensuelles d'Obstétrique et de Gynécologie.

July, 1914.

1. *Congenital tuberculosis. By WERNER MÖLLER.
2. *Hollowing of the stump in subtotal hysterectomy. By DE ROUVILLE.
3. *Dermography of pregnancy. By H. TREUB.

August, 1914.

1. *Cæsarean section performed late in labour. By ZARATE.
2. *Antigonococcic serum and vaccine therapy. By GAUJOUX.

September, 1914.

1. *Experiments with pituitrin. By ESBENSEN.

October, 1914.

1. *Two fibromata of the broad ligaments. By HALLER.

November, 1914.

1. *Pyosalpinx rupturing into the bladder. By AUVRAY.

**Congenital tuberculosis.** Werner Möller discusses the occurrence of this condition and confines the term of congenital tuberculosis to cases in which there is microscopic evidence of the disease in fœtuses or children so young as to exclude the possibility of infection postpartum. Thus the finding of tubercle bacilli in the tissues without evidence of tubercular lesions suggests a postpartum infection. Macroscopic evidence is not sufficient, for lesions resembling tubercular miliary granulations may be caused by other bacilli. The fœtus may be infected during parturition by swallowing or inspiring contaminated fluids or possibly, as has been suggested by Gartner, through the rupture of chorionic villi. For example, a case recorded by Harbitz relates the lesions found in a child twenty-five days old in which Möller thinks the lesion was acquired during the birth. Further, the progress of tuberculosis in early life is so rapid that it is unsafe to consider the lesions as certainly congenital if the child survives more than fourteen days. An illustrative case is given in detail with microphotographs.

As to the mode of infection Möller seems inclined to reject direct infection from ovum or spermatozoid. Its occurrence is at best theoretical and not proved, and it is difficult to imagine that an infected ovum should survive. Accordingly there remain the routes per os, that is from infected liquor amnii, or through the placenta, tuberculosis of which was first described by Lehmann. Various forms of this disease are described—of the intervillous spaces, more rarely primarily of the villi, *endometritis deciduæ basalis caseosa* and tuberculosis of the amnion. Möller thinks that in his case the localisation of the lesions suggests infection per os, though he does not claim to have proven his diagnosis.

A bibliography is appended, and it is somewhat remarkable in this July number to find a French magazine giving all the German quotations in the text untranslated. E. H. L. O.

**Hollowing of the stump in subtotal hysterectomy.** De Rouville discusses the merits of total or subtotal hysterectomy, and declares himself a partisan of the partial operation in suitable cases. There are forms of cervical leucorrhœa which persist somewhat intractably after hysterectomy, such as in women for whom the uterus has been removed on account of gonorrhœal salpingitis. In such cases the cervix should be removed with the uterus, but many forms of disease do not require the radical operation; and to avoid some of the troubles resulting from the presence of the cervical stump, De Rouville proceeds to bore out the interior of the stump systematically. To permit of this he ligatures the uterine arteries as low as possible, immediately below the origin of the superior vaginal arteries. By taking out a complete ring from the whole length of the cervix, drainage can be obtained when it is thought advisable. In any case, cancer from the interior of the cervix—the commonest form after ablation for fibroids—will not occur. The article is illustrated.

E. H. L. O.

**Dermographism in pregnancy.** Professor Treub discusses this condition in which the skin preserves for a considerable time the trace of pressure marks. Treub describes some cases and cannot explain the anomalous features, such as a woman on whom pressure marks persisted as white areas during narcosis, but not in the waking state; while, in others, the anæsthetic made no difference. In some the pressure mark shows white; in others red; in some white or red, according as the patient is lying or standing; in others, again, there is a red area with a white halo. The article is illustrated with photographs. E. H. L. O.

**Cæsarean section performed late in labour.** Zárate contributes a paper in which he proposes to extend the indications for Cæsarean section to cases of women who have been long in labour, and have been submitted to numerous examinations. Schauta, for example, makes three groups of his patients admitted with contracted pelvis. In the first he places aseptic cases admitted with the membranes unruptured; in the second category he places neglected cases with the membranes long ruptured, but not having been submitted to examination; and in the third category he places cases evidently or only possibly septic. Schauta reserves the classical Cæsarean section for the first category only, treating the others by Porro's operation or craniotomy, or some extraperitoneal method.

Zárate relates four successful operations on women who had been long in labour, including one with gonorrhœal vaginitis, in whom the membranes had been ruptured for sixty-two hours. He describes the technique of the operation, which is briefly as follows:—The abdominal wall is sterilised with iodine; the woman is placed on a table capable of being put in Trendelenburg's position; median incision, about 20 centimetres; exteriorisation of the uterus. An assistant then seizes the edges of the abdominal wound with two forceps, which are crossed so as to allow of the wound being kept closed by another forceps grasping both walls. The wound is covered with compresses, and the uterus is then covered with a sheet and the woman is placed in Trendelenburg's position. The uterine incision is then made through the sheet, which an assistant keeps tightly applied to the uterus by holding it down on the fundus and by pulling on its lower edge, thus keeping close contact during the retraction of the uterus. Compresses are used to aid in extracting the placenta and membranes. The cavity of the uterus is swabbed with tincture of iodine if the os is dilated; if not a piece of iodoform gauze is passed down through the cervix, and the uterine cavity is packed. The uterine wound is iodised. Before proceeding to suture the uterine wound the sheet is removed, and the surgeon and assistants change their gloves and take fresh instruments. After the first layer of stitches the wound is moistened with iodine solution before the Lembert sutures are passed. A piece of gauze is placed over the uterine wound in the form of a bag, with a thread passing inside to its upper end so as to invert it during removal; its lower end comes out at the lower end of the abdominal wound, not so much as a drain, but to protect the abdominal cavity. To ensure this an assistant must immobilise the uterus during the suturing of the abdominal wound. This gauze is removed in forty-eight hours, to be followed by a glass or rubber drain where necessary; the intra-uterine gauze is removed in twenty-four hours. He hopes to be able to do without the abdominal gauze. E. H. L. O.

**Antigonococcic sero- and vaccinotherapy.** Gaujoux gives a general review of this subject. He concludes that antigonococcic vaccins are of little if any diagnostic value, and of little curative value in urethritis and vaginitis; this is probably on account of the varieties of gonococcus and on account of the numerous other toxic bacilli present. They are, however, of limited value in the vulvo-vaginitis of little girls, though relapses are frequent. Vaccinotherapy has given good results in gonorrhœal salpingitis and in certain forms of ophthalmia neonatorum. Up till the present time researches in the production of an efficient antigonococcic serum have been fruitless. E. H. L. O.

**Pituitrine—experimental researches.** Esbensen gives the results of his own observations carried out with pituitrine, P. D. & Co., and with pituglandole,

Hoffmann la Roche, of which he prefers pituitrine, as all the cases which at the end of the confinement failed to react were treated with pituglandole.

In eight abortions the result was good in five, and there was no tendency to closure of the os as has been described by some observers.

In twenty-seven of premature labour five did not react (of these the effects were not waited for in two). Of women injected at the beginning of labour several required to have the dose repeated one or several times. Contraction of the os was not observed.

In 129 labours at term there were 40 failures, but Esbensen thinks the results would have been better if he had used pituitrine exclusively. Pituitrine does not stimulate a uterus which is already contracting well. In three cases the contractions were tetanic, in two of which they were already tetanic before administration of the drug.

Esbensen does not think that pituitrine administered during labour produces postpartum atony : on the other hand, pituitrine does not cause a lasting contraction of the uterus postpartum. In no case could any cause of suffering to the child be ascribed to the use of pituitrine, nor did the mother suffer more than passing inconvenience, but Esbensen is of opinion that eclampsia, present or threatened, is the only contra-indication on the part of the mother. E. H. L. O.

**Two cases of fibroma of the broad ligament.** Haller describes two fibromas, one of which was primary of the broad ligament and the other was secondary, having sprung originally from the uterus. The origin of the " primary " tumours has been much disputed : for some time they were supposed to be really secondary. Sänger was the first to allege a primary origin—that is, from the muscular fibres described by Rouget as lying between the layers of the broad ligament. Further, remains of the Wolffian body, accessory suprarenals and accessory portions of Fallopian tubes may be the starting point. The secondary tumours arise most commonly from the uterus, also from the round ligament, tube, ovary and ovarian ligament.

E. H. L. O.

**Three observations on pyosalpinx rupturing into the bladder.** Auvray publishes three cases in which non-tubercular, suppurating Fallopian tubes ruptured into the bladder. It is somewhat remarkable that in all three patients the rupture occurred without any symptoms to draw the attention of the patient, and this course of events has been frequently noted. It is possibly also for the flow of pus through the bladder to continue for years without setting up any inflammatory disturbance in the bladder or kidneys. Two of Auvray's cases terminated in death; all three patients were treated by hysterectomy without suture of the vesical wound. The diagnosis was comparatively easy from the history, though in one case it was at first thought possible that the abscess had originated in the appendix. Cystoscopic observation was useful, and a coloured plate is given of one of the cystoscopic pictures.

Expectant treatment is not to be recommended, as an early operation tends to forestall the infective results likely to occur in the urinary tract.

Various operative procedures are discussed. Dr. Auvray himself operated by removing the uterus and adnexa by the abdomen route. He satisfied himself that in his cases suture of the bladder was useless, for fluid injected into the bladder did not flow into the abdomen, and the tissues were so friable that sutures would not have held. The prognosis must be guarded, for even if the patient recovers from the operation the ultimate complete recovery must depend largely on the extent of the lesions in the bladder and urinary tract. E. H. L. O.

# REPORTS OF SOCIETIES.

## THE ROYAL SOCIETY OF MEDICINE.

### SECTION OF OBSTETRICS AND GYNÆCOLOGY.

Meeting held Thursday, May 6th, 1915, Dr. W. S. A. GRIFFITH in the Chair.

SPECIMENS.

Dr. BRIGHT BANISTER showed (1) twisted omentum, simulating twisted ovarian cyst; (2) placental attachment to fœtal head.

Remarks by the PRESIDENT.

Mr. T. G. STEVENS showed a specimen of rhabdomyoma of the vulva. The tumour was the size of a small orange, and had existed and slowly enlarged for the past three years. It was situated at the posterior part of the labium majus, and was not pedunculated. The skin over it was thinned and on the point of breaking. Microscopically, the tumour is composed of a delicate fibrillated stroma, enclosing elongated masses of protoplasm with oval nuclei, but no very clearly defined cell outlines. The general appearance of these protoplasmic masses is that of immature striated muscle. There is some longitudinal striation to be seen, but no transverse striation can be demonstrated. The stroma in parts is degenerate, and shows some liquefaction and minute cyst formation. The tumour is encapsuled and shows no evidence of malignancy.

Remarks by Dr. HERBERT SPENCER, Dr. CUTHBERT LOCKYER, and Dr. BLAIR BELL.

Reply by Mr. T. G. STEVENS.

Mr. W. GILLIATT showed viscera from a fatal case of eclampsia.

Remarks by the PRESIDENT.

Dr. C. E. PURSLOW demonstrated a case of

TUBAL PREGNANCY, SHOWING FŒTUS UNDERGOING DISSOLUTION.

The specimen was removed by abdominal section from a married multipara, æt. 31. Menstruation had been regular until twelve weeks before admission to hospital. Amenorrhœa then set in, and continued until a fortnight before admission, since which time there has been continuously slight loss. There had been two typical attacks of pain with faintness. On examination, there was a well-marked tumour in the left iliac region This was diagnosed as a tubal pregnancy, but the physical signs were unusual, in that the swelling was entirely above the pelvic brim and could not be reached by the finger either in the vagina or the rectum. The specimen shows the unruptured distended tube. Cross sections have been made, and these show a diameter of 2¼ in. The tube was filled with firm blood-clot, in the centre of which was an amnial cavity containing turbid fluid, and in this was found the macerated head of a fœtus of about ten weeks' development; no other part of the fœtus could be found. The specimen is interesting as showing that a fœtus as far advanced as this can macerate and disappear in the liquor amnii.

Dr. BLAIR BELL read a short communication on

INFUNDIBULIN IN PRIMARY UTERINE INERTIA AND IN THE INDUCTION OF LABOUR.

It was pointed out that infundibulin, introduced by the author in 1909, had established its place in obstetrics owing to its power of promoting and

augmenting rhythmical contractions during and after parturition. The author now called attention to the fact that although the induction of labour can rarely be effected by administration of infundibulin alone, yet this extract has the power of sensitising the uterus before labour; consequently the administration of infundibulin in conjunction with other mechanical measures, such as the insertion of a pack or of bougies, leads to certain and rapid induction of labour. In this connection a case of placenta prævia, in which serious bleeding occurred in the eighth month, was mentioned. The cervix was packed with gauze, and infundibulin was injected with an excellent result. The great value of infundibulin in primary uterine inertia also was emphasised. It was pointed out that this was as noticeable when the inertia was diagnosed before labour commenced as during labour. In the former circumstances the uterus could be sensitised and its tone improved during the last two weeks of gestation, and an interesting case was quoted by way of illustration.

Remarks by the PRESIDENT, Dr. MAXWELL, Dr. HEDLEY, Dr. ROBERTS, Dr. DRUMMOND ROBINSON, and Dr. PURSLOW.

Reply by Dr. BLAIR BELL.

Mr. DOUGLAS DREW read a short communication on

COMPLETE INVERSION OF THE VAGINA AFTER HYSTERECTOMY ASSOCIATED WITH VESICAL CALCULUS.

A patient, æt. 53, had undergone a total hysterectomy for fibroids twelve years previously. Within a year of the above operation the vagina became completely inverted. The condition had not been treated for the past ten years. A large calculus was removed by supra-pubic cystotomy, and the prolapse was treated by Le Fort's operation and colpoperineorrhaphy.

Remarks by the PRESIDENT.

Dr. DRUMMOND MAXWELL read a short communication on

DIPHTHERITIC STENOSIS OF THE VAGINA.

Remarks were made by the PRESIDENT and Dr. HERBERT SPENCER.

Dr. BLAIR BELL read a paper on

SO-CALLED TRUE HERMAPHRODITISM.

The meaning of "true hermaphroditism," so far as man is concerned, was first discussed and contrasted with the phenomenon seen in invertebrates. A complete classification of hermaphroditism in all its varieties was given to illustrate the biological importance of the condition. It was pointed out that the so-called "true hermaphroditism" in man should be termed "glandular partial hermaphroditism." All the really authentic cases (probably four in number, apart from the author's case) have had ovo-testes. Many of the recorded cases of "true hermaphroditism" had been disproved, and this specially applied to those cases in which a separate ovary and testis had been recorded. Further, all the cases with ovo-testes had shown predominating feminine characteristics. The author's case was that of a patient who had presented all the characteristics of femininity, with regular menstruation, until 18 months after puberty, when menstruation ceased and masculine characteristics developed; these included a bass voice and an excessive growth of hair on the body with masculine distribution. At first a diagnosis of suprarenal hyperplasia was made, and the patient was treated with ovarian and thyroid extracts. Later laparotomy was performed, and sections were removed from both gonades. The left had the macroscopic appearance of a testis. The pathologist, however, reported that the left gonad was the seat of columnar carcinoma. Consequently the abdomen

was re-opened, and the gonades, tubes and fundus uteri were removed. On examining the sections, the author came to the conclusion that the left gonad was an ovo-testis and not the seat of a malignant growth. The patient was, therefore, a glandular partial hemaphrodite. The histological appearances were fully discussed and the relation of ovo-testes to the normal development of the gonades was considered. Finally, criteria determining glandular partial hermaphroditism were suggested.

Remarks by the PRESIDENT.

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## ROYAL ACADEMY OF MEDICINE IN IRELAND.

### SECTION OF OBSTETRICS.

President—J. GIBSON, M.D.

Sectional Secretary—GIBBON FITZGIBBON, M.D.

Meeting held Friday, April 30, 1915, Dr. R. D. PUREFOY in the Chair.

### ROTUNDA REPORT.

Drs. D. E. TOTTENHAM and E. C. CRICHTON.—Owing to the absence of the Master, Dr. Jellett, great difficulty was experienced in compiling portions of this year's report. During the year ending October 31, 1914, 2,083 patients were delivered in the Extern Department and 2,303 patients were admitted to the maternity wards. Of the latter number 367, who were not in labour, were discharged, and 1,936 were delivered. Thus a total of 4,019 labours in all were attended by the hospital staff, showing a decrease of 117 on the previous year. Five deaths occurred in the Extern Department and 17 in the Intern. The morbidity rate was appreciably lower than the previous year, and is represented by the figure of 4.43 as against 6.07. There were three cases of concealed accidental hæmorrhage. The rest of the report dealt with some cases of special interest and tabulated tables of the various complications of labour met with during the year together with a short summary of the work done in the gynæcological side of the hospital.

Dr. HASTINGS TWEEDY congratulated the Assistant Masters on the manner in which they had fulfilled their arduous task without any help, for their Master, Dr. Jellett, was serving his country in France. This completed the thirty-third consecutive report which had been published from the Rotunda, and throughout the United Kingdom there was no record which could compare with these statistics in regard to the amount of material dealt with.

He was glad to see the morbidity rate had improved, for this index pointed to and was the measure of the real value of a maternity institution.

In respect to the treatment of eclampsia, he did not think treatment followed with precision the methods which had yielded such excellent results during his (Dr. Tweedy's) mastership. He noticed chloroform, saline injections, and much smaller doses of morphia in use than formerly. Neither salt nor chloroform should be given to an eclamptic, and morphia unless pushed to its full doses did more harm than good.

Dr. MADILL said there were one or two points referred to by Dr. Tweedy upon which he might be able to throw some light. He agreed with him when he emphasised the morbidity standard of successful practice. He was

struck, for a couple of years past, by the number of morbid cases in which the morbidity was taken on the B.M.A. standard; in some of these cases it was hardly right to have treated them as morbid.

Referring to the case of inverted uterus, he said, this case occurred in the Extern Department, and, as far as he recollected, the patient was alive when the Assistant arrived. The uterus was plugged, but she died shortly afterwards.

In the eclampsia cases bicarbonate of soda was not discontinued altogether. It was simply discontinued for submammary infusions. He understood that the patients reacted more quickly to saline than to bicarbonate of soda. The latter was always used for washing out the stomach.

He remembered one case of rupture of the symphysis in which the forceps was applied, and without any great pull there was a distinct crack and the symphysis ruptured. The patient was treated in the same way as if pubiotomy had been done, and she recovered.

Both of the ovarian tumours were dermoids; one of them was diagnosed before operation. It was really to save time that no examination was made to discover whether one of the ovaries could be left.

Dealing with the report itself, there was only one case that he wished to refer to—viz., the first case under the heading " pubiotomy." In this case the record did not say whether the child was delivered immediately with forceps or not.

Dr. SOLOMONS said he considered it a pity that any changes were made in the treatment as laid down by Dr. Tweedy in cases of eclampsia. During the last two years of Dr. Tweedy's mastership, when he (Dr. Solomons) was his assistant at the Rotunda, thirty consecutive cases of eclampsia were treated during that time without a death. He suggested that attention to the minor points was the chief factor in bringing about this successful result. He enquired if scopolamine morphine anæsthesia was still used at the Rotunda. He considered it was a method not to be set aside. Under the heading " contracted pelvis " he noticed that in several of the cases of Cæsarean section the pelvis was not measured. He thought that pelvimetry should, if possible, be performed on these women. He would like to know if atropine was being used as a routine with morphine in eclampsia. Referring to prolapse of the cord, he asked if reposition was being carried out. Turning to the gynæcological portion of the report, he mentioned that the number of cases of operation for vesico-vaginal fistula appeared to be large. He was anxious to know the after results of these operations. He was surprised to see that where Gilliam's operation was performed it was thought necessary to do ventral suspension as well. Either of these operations should suffice.

Sir WILLIAM SMYLY joined in the congratulation of the Assistant Masters on their admirable report; the copious tables were especially instructive. He considered that morbidity was a truer test than mortality in estimating the value of the methods adopted in an institution. On looking over his own statistics he was struck by the change which took place about half way through his term as Master. In the first half the results were bad and in the second good. This he attributed to improvement in the nursing after Miss Hampson's appointment, together with structural changes in the hospital, which had practically abolished sepsis; to the abandonment of accouchement forcé in accidental hæmorrhage, and of chloroform in the treatment of eclampsia. Referring to scopolomine morphine, he considered that the combination was useful in cases where morphia had long been used,

but in the second stage of labour it did not appear to him to be as good as chloroform.

Dr. GIBBON FITZGIBBON considered the number of concealed accidental hæmorrhage cases large (3) compared with what appeared in previous reports. He thought it a pity that an estimate was not given of the amount of blood lost, and that in the third case there was no post-operative report giving some idea of the amount of free blood contained in the uterus. The case in which the symphysis was ruptured was reported as one of acute yellow atrophy, which he considered would account for the death. He agreed that it was inadvisable to go on with Cæsarean section in the case of double dermoid cyst.

The CHAIRMAN said he would like to share in the congratulation expressed on the work of the Assistant Masters. Dr. Tweedy had properly pointed out that it was interesting and important to have the series of reports unbroken. It had not been observed by those who had already spoken, what he thought as an Assistant was true and even still thought, that at certain times of the year, particularly in the early autumn and spring, there was a great difficulty in preventing the occurrence of sepsis. When he was an Assistant at the Rotunda they were always glad when March had passed without any very distinct outbreak of sepsis. In those days such occurrences were not altogether unknown. He was unable to offer any explanation of this. Referring to Sir William Smyly's remarks about chloroform in the treatment of eclampsia he (Dr. Purefoy) had not a case for a long time, but he could recall a good many cases in past years in which he administered chloroform, in some of them without morphia, with results which were quite satisfactory.

He had always felt that in severe cases of accidental hæmorrhage the question of operation, either Cæsarean section or hysterectomy, was a very doubtful resource, and he considered that the report before them did not give any reason for changing his opinion on that point.

Dr. CRICHTON said that in the case of concealed accidental hæmorrhage there was a very large amount of blood, and Dr. Rowlette had a very good specimen. In the pubiotomy case the patient was delivered at once. He understood that Dr. Jellett did not approve of scopolomine. In the two Cæsarean section cases which were not measured, both patients arrived in hospital strong in labour. Dr. Jellett considered it a useless proceeding to replace the cord in the vast majority of cases. In the cases of vaginal fistula six of the seven patients left the hospital apparently cured.

Dr. TOTTENHAM thanked Dr. Purefoy, Sir William Smyly, and Dr. Tweedy for the assistance given in compiling the report.